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AN ILLUSTRATED MONTHLY

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THE NATIONAL GEOGRAPHIC MAGAZINE

THE ALASKAN BOUNDARY TRIBUNAL*

BY HON. JOHN W. FOSTER, LL. D.

THE Tribunal which was recently in session in London and which adjusted the irritating and dangerous controversy respecting the Alaskan boundary was an unique body. It was not an arbitration tribunal in the usual acceptation of that term, as there was no umpire or neutral judge. Its membership was composed of three persons nominated by each government, and as a decision to be effective required the concurrence of a majority of the court, it was necessary for the settlement of the controversy that at least one member should decide against the contention of his own government.

It was insisted by the opponents of the measure that it would prove a useless proceeding, as a majority decision could not be obtained. Its friends, however, felt that the question was of such a character as to offer a solution by sober-minded judges, before whom the facts should be presented in a judicial manner; and, even if unhappily there should be a failure to secure an effective decision, the effort would not be in vain, as the evidence upon which each party relied in support of its contention would be accessible to the public, and it would be enabled to make an intelligent study of the controversy.

In 1896 a notable conference of the friends of arbitration from all parts of the United States was held in Washington to urge upon our government the making of a treaty of arbitration with Great Britain.

That movement resulted in the framing of a convention in January, 1897, signed by Mr. Olney, Secretary of State, and Sir Julian, afterward Lord, Pauncefote. These two eminent statesmen, while they agreed that most questions of an international character might be referred to an impartial and neutral arbitrator for decision, also agreed that there were other

* A lecture delivered in Dr Foster's course in American Diplomacy in Columbian University, Washington, D. C., December 8, 1903.

questions which nations would not stipulate in advance to submit to that method of adjudication. Prominent among these were territorial disputes, and in their convention they provided that all such disputes should be referred to a tribunal to be composed of six judges, three to be selected by each government. That treaty failed of ratification in the Senate by a close vote, but it indicated the method which has been followed with such successful results by President Roosevelt and Secretary Hay respecting the Alaskan boundary.

From the very beginning of our independence as a nation the boundary line dividing the United States and Canada has been the source of almost constant discussion, often of angry controversy, and more than once has brought the countries to the brink of war. As in the Alaskan question, these disagreements have arisen mainly from a want of correct geographic knowledge on the part of the negotiators of the treaties. For instance, in the treaty of peace and independence of 1783, in which an attempt was made, as stated, to set forth the boundary with such accuracy that all disputes which might arise in the future would be prevented, the initial point on the east was fixed at the mouth of the St Croix River, in the Bay of Fundy. But when it was sought to establish the boundary line, it was found that there was no river in that locality popularly known as the St Croix, but that there were two considerable rivers emptying into the Bay of Fundy, both of which had other names than that mentioned in the treaty. This question was settled amicably by the unanimous action of a commission.

It was, however, followed by a controversy as to the ownership of the islands in and near Passamaquoddy Bay. After years of diplomatic discussion, it was referred to a commission of one American and one Englishman, and they reached a settlement without the intervention of an umpire.

The commission established the line to the head of the St Croix River, but the boundary from the St Croix along the Maine-New York frontier to the St Lawrence proved to be the most irritating, difficult, and tedious of the disputes between the United States and Great Britain. It was first referred to commissioners, who failed to agree, and after much diplomatic wrangling was submitted to the arbitration of the King of the Netherlands, the validity of whose decision was questioned, and it was thrown back into diplomacy. New surveys were made and a temporary boundary established, but it was not observed by the people in the vicinity. Strife occurred; a state of border warfare was created; Congress authorized the President to call out the militia, and voted $10,000,000 for public defense. An open conflict between the two nations seemed imminent. The commander-in-chief of the army, General Scott, was dispatched to the frontier, and through his interposition a temporary border truce was arranged. After still further delays, in 1842 the Secretary of State, Mr Webster, and a special plenipotentiary from Great Britain, Lord Ashburton, agreed upon a treaty fixing accurately that boundary. It is an interesting fact that the essential points of that dispute were similar to those as to the Alaskan boundary. The "highlands" and the "ocean" became the words about which the northeastern controversy raged. Likewise the late subject of discussion at London was in great measure that respecting the phrase in the treaty, "the summit of the mountains," and the words "ocean" and "coast."

The line through the St Lawrence and the Great Lakes was adjusted by a commission after careful surveys, by which various islands which had been claimed and occupied by the Canadians

were transferred to the American side of the line, and others claimed by the Americans were placed on the Canadian side.

The fixation of the boundary from Lake Superior to the northwestern point of the Lake of the Woods was entrusted to a commission, but after five years of labor, during which they visited the region and expended $200,000 in surveys, they failed to agree. Under the stipulations between the two governments, the question should then have been referred to arbitration; but the experience in the arbitration of the Maine boundary did not encourage such a course. After long delays this portion of the frontier was adjusted by the Webster-Ashburton treaty of 1842, but this settlement has not proven completely satisfactory, owing to defective landmarks, as it is charged by Canadians that the United States Land Office has surveyed, platted, and sold to Americans a considerable extent of land in the Minnesota-Wisconsin section which really belongs to Canada.

The line from the Lake of the Woods to the Rocky Mountains was fixed by the treaty of 1818 to run along the 49th degree of north latitude.

The boundary from the Rocky Mountains to the Pacific Ocean remained for forty years a subject of controversy. It engaged the attention of successive administrations up to the presidency of Mr Polk, various treaties and arbitral propositions being advanced only to be rejected by one or the other of the two nations. The claim to the whole territory on the Pacific Ocean from California to the Russian possessions at 54° 40′ was asserted by the Democratic National Convention of 1844, and under the cry of "Fifty-four forty or fight" entered largely into the campaign which resulted in the election of Mr Polk. In his first message to Congress he declared our title to this region to be "clear and unquestionable," and he recommended Congress to extend jurisdiction over it. John Quincy Adams, who was recognized as the highest living American authority on international questions, held with President Polk that our title up to 54° 40′ was complete and perfect.

The controversy grew so animated that the chances of war were freely discussed; but the two nations found a better way of reconciling their differences, and, after anxious deliberation, Mr Buchanan, Secretary of State, and the British Minister, signed a convention in 1846 whereby the line of the 49th parallel was extended from the Rocky Mountains to the Pacific Ocean. By this act the vast domain now embraced in British Columbia was yielded to Great Britain, although our title to it had been declared unquestionable by a national convention, by the President in his message, by Congress through joint resolution, and by our highest authorities on international law.

One more step was necessary before our chain of title to a fixed and unquestioned line from the Atlantic to Pacific should be complete. The treaty of 1846 provided that the water line of the boundary should follow the middle of the channel which separates the continent from Vancouver Island. In this body of water lie a number of islands, and it was not clear which was "the middle of the channel" among these islands. In this state of uncertainty the islands were being populated by both Americans and Canadians, and conflicts of authority arose. Efforts were made to reach an agreement through diplomacy, but they failed. In 1856 a joint commission was appointed, but the members, after visiting the region in dispute, were unable to agree. The subject went back into diplomacy, and more than ten years were spent in fruitless discussion. In 1859 the settlers on San Juan Island came into conflict, the troops of the two coun-

tries became involved, and a collision seemed imminent. A second time the services of General Scott were invoked, and he arranged for a joint and peaceful occupation by troops of the two nations, but with difficulty were they able to prevent conflicts of the civil authorities. Finally, when the Joint High Commission to arrange the Alabama claims and other matters met in Washington in 1871, the question of the true channel was submitted to the arbitration of the Emperor of Germany, and he rendered an award in favor of the contention of the United States.

The foregoing review shows, first, what a perennial source of trouble have been our boundary disputes with Canada, and what a threatening peril to our peace it is to leave them unsettled. It is seen that every step of the frontier line, from the initial point on the Atlantic to the last water channel on the Pacific, has been a matter of controversy, and sometimes of such bitter contention as even to threaten war. Second, our public men and the government have not found a strong title to territory a bar to the submission of boundary questions to the adjudication of a commission or an arbitrator. In repeated instances have we given up territory which has been in possession of our citizens for years. Third, while our northern boundary has been adjusted by means of treaties, commissions, and arbitration, the Alaskan Tribunal was the first instance in which an equal number of jurists from each government have sat as a court, observing the forms of judicial proceedings, and rendering a decision binding upon the parties litigant. The result of its labors certainly confirms the wisdom of the President and Secretary of State in devising this method of adjustment of a most embarrassing controversy.

As there seems to exist in the public mind a vague and ill-defined idea of the questions at issue between the two governments which were submitted to the Tribunal for adjudication, it may be well to make as brief a statement as may be of these questions. They depended entirely for their solution upon the construction and application of the stipulations of the treaty entered into in 1825 between Great Britain and Russia. This treaty defined the rights of the two parties, first, in the North Pacific Ocean; and, second, on the northwest coast of North America. In order to accurately fix the latter a boundary line was agreed upon dividing the possessions of Russia from those conceded to Great Britain, and this boundary consisted of a water line and one upon the mainland.

The rights of the parties continued to be governed by this treaty up to 1867, when Russia ceded and transferred all its territorial possessions in America to the United States, and in doing so she inserted in the treaty of cession to the United States the exact text of the treaty with Great Britain of 1825 relating to the boundary. Hence, in order to determine the territorial rights of Alaska and Canada, recourse must necessarily be had to the Russo-British treaty.

In the official and public discussion which preceded the treaty of January 24, 1903, creating the Alaskan Boundary Tribunal, and in the document submitted by the two governments to that body, as also in the oral argument before it, much was said about the historical facts and negotiations preceding and attending the signing of the treaty of 1825, and the acts of the governments and their officials since that event, such as the publication of maps and charts, occupation of the territory in dispute, and the admissions or statements of officials. But it was conceded on both sides that all these matters had no other influence on the questions at issue than to aid in the interpretation of the stipulations of the treaty.

The negotiators of the treaty of 1825, in setting forth the boundary line, were governed by the geographical knowl-

edge within their reach at that day. As early as the sixteenth century explorers had visited the northwest coast of America, but up to the last decade of the eighteenth century very little accurate knowledge of that region existed. Between 1792 and 1794 Captain Vancouver, of the British navy, visited this coast, sent out by his government to discover the supposed passage or water connection between the North Atlantic and Pacific Oceans. He made very careful surveys of the coasts of the continent and islands, and his narrative and charts, giving detailed results of his surveys, were published in 1798. These were the main sources of information upon which the negotiators sought to fix in the treaty of 1825 the boundary line between the Russian and British possessions.

They described the water line as follows: "Starting from the southernmost point of the island called Prince of Wales Island, . . . the said line shall ascend northward along the passage called Portland Channel as far as the point of the mainland, where it reaches the 56th degree of north latitude." The first matter which the tribunal had to determine was, what is the Portland Channel as described in the treaty, and

Map Showing Boundary in Portland Canal

to draw the line in accordance therewith from the southern point of Prince of Wales Island to the 56th degree of north latitude.

An examination of the maps will show that the body of water variously described as Portland Channel or Canal is composed in part of two inlets from the ocean, one a broad and easily navigable channel to the south, and to the north a narrow, somewhat tortuous, and unsafe passage. Between these passages lie a group or series of islands. The American contention was that the broad or southern passage was the Portland Channel of the treaty. The British claim was that the narrow or northern passage was the one intended by the negotiators. Vancouver's charts and later maps favored the American view, but his Narrative seemed to support the British case. The Tribunal decided against the American contention, but did not accept in full the British claim, as the two larger islands only were made British territory, and the two smaller islands involved in the controversy were awarded to the United States. This part of the decision has occasioned the most bitter criticism and is the chief matter of complaint in Canada. This feeling is in part explained by the fact that Port Simpson, situated on the southern side of the entrance to Portland Canal, has been fixed upon as the Pacific terminus of the newly projected transcontinental railway, and it was urged that, for strategic purposes, all the islands on the north or opposite sides should belong to Canada.

The other work of the Tribunal was to determine the mainland boundary line. The treaty provided that from the head of Portland Channel the line should be drawn to the 56°, and "from this latter point the line of demarcation shall follow the crest of the mountains situated parallel to the coast. . . . That whenever the crest of the mountains which stretch in a direction parallel to the coast from the 56th degree of north latitude . . . may lie at a distance of more than ten marine leagues from the ocean the boundary between the British possessions and the coast strip (*lisière*) mentioned above as having to belong to Russia, shall be formed by a line parallel to the sinuosities of the coast, and which can in no case be more distant therefrom than ten leagues."

Vancouver saw as he sailed up and down the northwest coast of America, as likewise modern tourists, all along the Alaskan mainland a constant series of mountains. He made no explorations in the interior of the continent; but in drawing his charts he depicted a regular and continuous chain of mountains from the head of Portland Canal up to Mt St Elias, running around the heads of all the inlets and arms of the sea. The map-makers who succeeded Vancouver adopted with more or less accuracy this feature of his charts. It was this topographical indication which the negotiators had in view when they drafted the text of the treaty just quoted. They regarded this supposed mountain chain as a natural and proper boundary.

But later explorations have shown that the mountain chain depicted by Vancouver and other cartographers of the period preceding the treaty had no existence in fact, but that the mainland, extending back for ten leagues and more from the coast, is what has been termed "a sea of mountains," with no dominant and well-defined chain. The American claim, therefore, was that the natural boundary contemplated by the treaty having no existence in fact, the ten marine league line mentioned therein should apply, and that the United States boundary should follow the sinuosities of the coast and always ten marine leagues therefrom, passing around all the inlets of the sea.

On the other hand, the British con-

tention was that the crests of the mountains nearest to the sea should be taken as the boundary line. The Canadian experts claimed to have established a series of peaks or mountain chains sufficiently parallel to the coast to meet the requirements of the treaty. In conformity with this theory a boundary line delineated on the map was put forward, which rarely diverged more than five miles from the sea and often was less than a mile therefrom, which cut across the heads of all the inlets, divided the "coast strip" or *lisière* of the treaty into sixteen disconnected sections of territory, and transferred to Canada towns, settlements, industrial establishments, and mines which had been in undisputed possession of Americans for many years.

The Tribunal decided that, under the treaty, the United States was entitled to a continuous strip of territory which extended around the heads of all the inlets, thus excluding all contact of British territory with the sea from Portland Canal north to Mt St Elias. It also fixed the eastern or interior boundary line at designated mountain peaks to conform to this decision. While this interior line did not extend ten leagues from the ocean (the distance put forward in the case of the United States), it was a substantial acceptance of the most material claim of this country, and the result has been so regarded on both sides.

Much time was consumed and learned argument applied to the meaning of the terms of the treaty, "the crest of the mountains," the "ocean," the "coast," "sinuosities of the coast," etc., which can not be followed in the time at my command, but the foregoing is, I trust, a sufficient exposition to enable those not already informed to understand the two principal points at issue and how they were settled.

I turn now to a consideration of the composition, the preliminary work, and the proceedings of the Tribunal. It has already been stated that it was made up of three members appointed by each government. The treaty creating the Tribunal required that its members should be "impartial jurists of repute, who shall consider judicially the questions submitted to them, each of whom shall first subscribe an oath that he will impartially consider the arguments and evidence presented to the Tribunal and will decide thereupon according to his true judgment."

The President nominated on his part Elihu Root, of New York, Secretary of War; Henry Cabot Lodge, Senator of the United States from Massachusetts, and George Turner, late Senator of the United States from the State of Washington. Since the dissolution of the Tribunal it has been disclosed that the Canadian Government complained to the British Colonial Office that the members nominated by the President of the United States were not such persons as were contemplated by the treaty, to wit, "impartial jurists of repute;" but it does not appear that the British Government regarded this complaint of such a serious character as to bring it to the attention of the President. It was alleged that one of the American members had expressed himself publicly, sometime previous to his appointment, as strongly convinced of the justice of the claim of his government. It was also objected that no one of the three was taken from judicial life, and that they all might be considered as political rather than legal representatives of their country.

Whatever appropriateness there may have been in the objections urged by Canada, the sequel showed that the selection of the President was entirely fitting. It would be difficult to name three men in the United States with greater experience in and knowledge of public affairs, with better trained minds for the work they had to do, and who

possessed in a greater degree the confidence of their countrymen. It will doubtless be gratifying to you to state that they acquitted themselves in their delicate positions with entire credit to their country, without a word of criticism of their conduct, so far as I am aware, in either official or social circles of the British capital, and, without indulging in invidious comparisons, it may be said that they displayed a judicial temperament at least equal to their Canadian colleagues, and were as susceptible to the arguments of opposing counsel. On one of the points strongly contended for by the United States, that of Portland Channel, they decided against their own Government, an example which seems to have had no effect on their Canadian associates.

Even in the United States some press criticism has been passed upon the action of the President in this matter, and it has been asserted that he should have named judges of the United States Supreme Court or other high judicatory for the positions. It is due to the President to state that he offered the appointment to one of the justices of the Supreme Court, and that the latter declined, as it is understood, on the ground that he did not regard the post as in the proper line of his duties, and that it was not just to his associates to accept a position which would impose additional labor upon them A second justice was then approached with a like result. There seems to be a growing sentiment in this country that the members of our highest court should not be called upon to discharge functions of a semi-political character, such as those relating to boundary disputes, nor that they should be burdened with additional duties when their labors are already sufficiently onerous. A similar view has been expressed by some of the British press since the decision of the Tribunal, to the effect that the Lord Chief Justice of England should not have been placed in the embarrassing position of having to pass judgment against his country upon a question so greatly political, and which has consequently exposed him to bitter criticism.

The British Government named as members of the Tribunal Baron Alverstone, Lord Chief Justice of England; Sir Louis A. Jetté, Lieutenant Governor of Quebec, and John D. Armour, Judge of the Supreme Court of Canada. Judge Armour died soon after his appointment, and the vacancy was filled by A. B. Aylesworth, Esq., a prominent member of the bar of Toronto.

The duty of the Tribunal was prescribed to be to render a decision which was to be made up of answers to seven questions specifically set forth in the treaty. Experience has shown that the work of courts of arbitration and international commissions is not infrequently nullified or impaired by their members exceeding their powers in rendering their decision, or by departure from the terms of reference. All error in that direction was avoided in this instance by the careful manner in which the points at issue were set forth in the treaty.

The Case of each of the two parties was required to be prepared and delivered to the opposite party within two months from the date of the exchange of ratifications of the treaty, which occurred March 3, 1903. This was a short time in which to do such an important work; but, as the matter had already been the subject of much discussion and research, it was practicable to accomplish it in the period fixed. The Case for each government consisted of a statement of its views and contentions on the seven questions submitted to the Tribunal, accompanied by the documents, the official correspondence, and all other evidence in writing or in print upon which it relied. The Case of the United States, with the appendices, constituted a quarto volume

of about 650 pages and an atlas of maps, and the British case was of approximately the same length and character.

After receipt by each government of the Case of the other, a Counter-case in reply thereto was to be prepared and delivered within a like period of two months. Upon receipt of the American Case the British agent asked for an extension of two months, stating that it would be impossible to prepare a Counter-case for Great Britain within the period fixed by the treaty. Our government declined to agree to this extension of time on the ground that the reasons contemplated by the treaty had not been alleged and did not exist. The Counter-cases were accordingly exchanged within the period fixed therefor.

The third step in the pliminary proceedings was the preparation by counsel of a printed Argument, based upon the Case and Counter-case, and this also was to be prepared and delivered within two months after receipt of the Counter-case. This delivery was effected on September 2, and on the 3d of that month the Tribunal held its first meeting in London.

There was set apart in the Foreign Office in Downing street a series of apartments for the use of the Tribunal and those connected with it. The public sessions were held in the ambassadorial reception-room, a large and commodious hall, well lighted and artistically decorated. Adjoining this was a consultation-room for the private sessions of the Tribunal, and connected with it was the state dining-room, where a bountiful collation was served at the daily recess of the Tribunal. Adjoining the other end of the ambassadorial hall were a number of spacious rooms devoted to the use of the agent and counsel of the United States and the British agent and counsel.

I mention this matter in some detail in order that you may contrast it with the inadequate accommodations which are provided by our government for its foreign office, the Department of State. It has no facilities whatever for receiving and entertaining courts of arbitration, international commissions, and special diplomatic missions which are so frequently assembled in Washington. When the Anglo-American Joint High Commission met here a few years ago, quarters had to be taken at one of the hotels for its sessions, and we experience the same mortification almost every year. It is earnestly to be hoped that the present Congress will not adjourn without adopting adequate measures to remedy this discreditable condition and provide the Department of State with such accommodations as will enable our government to receive with proper courtesy its international guests.

The first meeting of the Tribunal was confined to an exchange of credentials of the members of that body and of the agents of the two governments, fixing the days and hours of the sessions, and the method which should be observed by counsel in the oral argument which was contemplated by the treaty. It was arranged that sessions should be held five days in the week, adjourning on Fridays to the next Monday, and that they should continue from 11 a. m. to 4 p. m. The British counsel were to open the argument, and it was to be closed by the American counsel, three lawyers on each side to speak alternately. The Attorney General of England, Sir Robert B. Finlay, opened for Great Britain, followed by David T. Watson, Esq., for the United States; Mr. Christopher Robinson, of Canada; Hon. Hannis Taylor for the United States; the Solicitor General of England, Sir Edward H. Carson; and Hon. J. M. Dickinson closing for the United States.

An adjournment of nine days was taken for the convenience of counsel, and on September 12 the oral argument began. It occupied eighteen days, the

only interruption being an adjournment upon the announcement of the death of Sir Michael H. Herbert, the British Ambassador in Washington, and to attend the funeral services held in memory of this young and brilliant diplomatist, who had united in framing and signing the treaty by which the Tribunal was created.

The time consumed in the oral argument may attract the notice of lawyers who are accustomed to the more expeditious methods in our domestic courts, the Supreme Court of the United States, for instance, rarely permitting arguments, even in important cases, to extend beyond two or three days; but such a period is not unusual in international tribunals. In the Fur Seal, or Bering Sea arbitration at Paris in 1893, the oral argument occupied forty-three days.

A noticeable feature of the London Tribunal was the marked contrast in the manner of argument or delivery between the British and American lawyers. The former were very deliberate in speech, rarely raising the voice, accentuating words, or using gestures, they sought to impress the court by their careful presentation of the facts and the cogency of their reasoning. This method was doubtless very effective, but when it extended in the person of one advocate through six or seven days it became somewhat tedious. On the other hand, the American counsel were vigorous in speech, frequent in emphasis, and somewhat active in gesture. They did not hesitate to indulge in a witticism to impress a point, and sometimes even ventured upon an amusing anecdote to illustrate their argument, which seemed to be welcomed by the court and enjoyed by the opposing counsel.

It is gratifying to note that during the entire sessions of the Tribunal the utmost good feeling and courtesy prevailed, not a single untoward incident occurring to mar the harmony of the proceedings.

The oral argument was closed on October 8, after which the Tribunal went into secret session. On October 20 its decision was delivered to the two agents representing their respective governments. As the treaty which provided for the adjudication and created the Tribunal did not go into effect till March 3, 1903, the entire proceedings occupied less than eight months, which constitutes an instance of promptness in international adjudication of magnitude and gravity almost without parallel.

As I have already given the substantial results of the decision, it is hardly necessary to repeat or elaborate them. The engrossed decision or award in duplicate was signed by Lord Alverstone and the three American members. The decision was accompanied by a series of five maps indicating thereon the boundary as set forth in the decision. These maps were attested by the signature of all the six members of the Tribunal.

The two Canadian members have been criticised, too severely, I think, for their action in refusing to sign the decision. They might find their defense in the language of the treaty itself, which says: "The decision . . . shall be signed by the members of the Tribunal assenting to the same." They also might cite distinguished precedents for their conduct. The Lord Chief Justice of England, Sir Alexander Cockburn, who represented Great Britain on the arbitration tribunal at Geneva which adjusted the Alabama claims, not only refused to sign the award, but accompanied it with a vigorous protest and rather unseemly conduct.* A similar

*Hon. Caleb Cushing, one of the American counsel, in referring to the closing session of that Tribunal, said: "To the universal expression of mutual courtesy and reciprocal good will there was but one exception, and that exception too conspicuous to pass without notice. The instant that Count Sclopis [the President] closed, and before the sound of his last

precedent is to be found in the Halifax fisheries arbitration of 1877, when the American member not only refused to sign the award, but questioned its validity. A better practice was observed in the Fur Seal arbitration at Paris in 1893. The two American members, Justice Harlan and Senator Morgan, were outvoted on almost every one of the six points submitted to the Tribunal; but, without withdrawing their votes, they cheerfully united with their colleagues in signing the award.

The two Canadian members of the London Tribunal did, however, incur more deserved criticism in their action in giving to the press, on the same day the decision was announced, a carefully prepared interview, in which they declared that the decision was not judicial in its character, the plain inference from which was that the majority members of the court had been influenced by improper motives, as the treaty required that they should determine "judicially" the questions submitted to them. They further gave it to be understood that their British colleague, after agreeing with them in their position as to Portland Channel, changed his attitude and voted with the American members; and they added that there is "no process of reasoning whereby the line thus decided upon by the Tribunal can be justified." It is hardly necessary for me to accentuate the impropriety of judges arraigning in the public press their colleagues on the bench for improper motives and inconsistent conduct. Lord Alverstone has said, referring to this matter, that he declined to justify or explain his conduct, because such a course would be a death blow to the confidence reposed in the British bench. He needs no vindication. No living man has had greater experience in international adjudications, and no one has done more to preserve peace and good will between the two English-speaking nations.

In view of the substantial failure to sustain the British contention as to the boundary, it is not strange that there have been angry criticism and bitter disappointment expressed in Canada. Similar feelings were manifested in England over the Geneva award. The people of the United States were very angry at the Halifax award, and were by no means pleased with the result of the Fur Seal arbitration at Paris; but the sober second thought of these Anglo-Saxon peoples has been that, however disappointing the outcome, this process of adjusting international disputes is better than to continue the controversies, and infinitely better than a resort to war. The British agent, Hon. Clifford Sifton, immediately after the announcement of the decision in London, said publicly in the most kindly spirit: "I have to say that the agent and counsel of the United States have acted with perfect courtesy and good faith throughout." And since his return to Ottawa and the resumption of his place in the Dominion cabinet he has announced that the decision will be accepted and carried into effect in good faith.

President Roosevelt has been credited by the public press with the statement that the result at London was "the greatest diplomatic victory of the United States during the present generation." It is not becoming in one who was a participant in the proceedings so characterized to discuss this declaration. I

words had died on the ear, Sir Alexander Cockburn snatched up his hat, and, without participating in the exchange of leave-takings around him, without a word or sign of courteous recognition for any of his colleagues, rushed to the door and disappeared, in the manner of a criminal escaping from the dock, rather than a judge separating, and that forever, from his colleagues of the bench. It was one of those acts of discourtesy which shock so much when they occur that we feel relieved by the disappearance of the perpetrator."

The Treaty of Washington, by Caleb Cushing. New York, 1873, p. 128.

may say, however, without impropriety that the greatest value of the decision is not in the detailed terms of the award, but in the fact that it brought to a conclusion an irritating controversy, that it removed a serious obstacle to better relations between these two neighboring countries.

The chief credit on the American side for this result is due to the President and the Secretary of State, who had the courage, in spite of the prevailing sentiment that it would be a useless proceeding and against many protests, to submit the question to a judicial tribunal. Still greater credit is due the Prime Minister of Canada, Sir Wilfrid Laurier, who, in the face of stronger opposition, consented to such a reference. While the outcome is not such as he desired, it must be a relief to him to know that this dangerous subject has been removed from the arena of controversy, and I feel sure that in time his people will recognize that he acted wisely and for the best interests of his country.

DECISION OF THE ALASKAN BOUNDARY TRIBUNAL

UNDER THE TREATY OF JANUARY 24, 1903, BETWEEN THE UNITED STATES AND GREAT BRITAIN

WHEREAS by a Convention signed at Washington on the 24th day of January 1903, by Plenipotentiaries of and on behalf of His Majesty the King of the United Kingdom of Great Britain and Ireland and of the British Dominions beyond the seas, Emperor of India, and of and on behalf of the United States of America, it was agreed that a Tribunal should be appointed to consider and decide the questions hereinafter set forth, such Tribunal to consist of six impartial Jurists of repute, who should consider judicially the questions submitted to them each of whom should first subscribe an oath that he would impartially consider the arguments and evidence presented to the said Tribunal, and would decide thereupon according to his true judgment, and that three members of the said Tribunal should be appointed by His Britannic Majesty and three by the President of the United States:

And whereas it was further agreed by the said Convention that the said Tribunal should consider in the settlement of the said questions submitted to its decision the Treaties respectively concluded between His Britannic Majesty and the Emperor of All the Russias under date of the 28th (16th) February A D 1825 and between the United States of America and the Emperor of All the Russias, concluded under date of the 18th (30th) March A D 1867, and particularly the Articles III, IV and V of the first mentioned Treaty, and should also take into consideration any action of the several Governments or of their respective Representatives, preliminary or subsequent to the conclusion of the said Treaties so far as the same tended to show the original and effective understanding of the parties in respect to the limits of their several territorial jurisdictions under and by virtue of the provisions of the said Treaties

And whereas it was further agreed by the said Convention, referring to

Articles III, IV and V of the said Treaty of 1825, that the said Tribunal should answer and decide the following questions:—

1. What is intended as the point of commencement of the line?

2. What channel is the Portland Channel?

3. What course should the line take from the point of commencement to the entrance to Portland Channel?

4. To what point on the 56th parallel is the line to be drawn from the head of the Portland Channel, and what course should it follow between these points?

5. In extending the line of demarcation northward from said point on the parallel of the 56th degree of north latitude, following the crest of the mountains situated parallel to the coast until its intersection with the 141st degree of longitude west of Greenwich, subject to the conditions that if such line should anywhere exceed the distance of 10 marine leagues from the ocean, then the boundary between the British and the Russian territory should be formed by a line parallel to the sinuosities of the coast and distant therefrom not more than 10 marine leagues, was it the intention and meaning of the said Convention of 1825 that there should remain in the exclusive possession of Russia a continuous fringe, or strip, of coast on the mainland not exceeding 10 marine leagues in width, separating the British possessions from the bays, ports, inlets, havens, and waters of the ocean, and extending from the said point on the 56th degree of latitude north to a point where such line of demarcation should intersect the 141st degree of longitude west of the meridian of Greenwich?

6. If the foregoing question should be answered in the negative and in the event of the summit of such mountains proving to be in places more than 10 marine leagues from the coast should the width of the *lisière*, which was to belong to Russia be measured (1) from the mainland coast of the ocean, strictly so-called along a line perpendicular thereto, or (2) was it the intention and meaning of the said Convention that where the mainland coast is indented by deep inlets forming part of the territorial waters of Russia, the width of the *lisière* was to be measured (*a*) from the line of the general direction of the mainland coast, or (*b*) from the line separating the waters of the ocean from the territorial waters of Russia, or (*c*) from the heads of the aforesaid inlets?

7. What, if any exist, are the mountains referred to as situated parallel to the coast, which mountains, when within 10 marine leagues from the coast, are declared to form the eastern boundary?

And whereas His Britannic Majesty duly appointed Richard Everard, Baron Alverstone, G.C.M G. Lord Chief Justice of England, Sir Louis Amable Jetté K C M G Lieutenant-Governor of the Province of Quebec, and Allen Bristol Aylesworth one of His Majesty's Counsel, and the President of the United States of America duly appointed the Honourable Elihu Root Secretary of War of the United States, the Honourable Henry Cabot Lodge, Senator of the United States from the State of Massachusetts and the Honourable George Turner of the State of Washington, to be members of the said Tribunal.

Now therefore we the Undersigned having each of us first subscribed an oath as provided by the said Convention and having taken into consideration the matters directed by the said Convention to be considered by us, and having judicially considered the said questions submitted to us, do hereby make Answer and Award as follows:—

In answer to the *first* question

The Tribunal unanimously agrees that the point of commencement of the line is Cape Muzon.

In answer to the *second* question

The Tribunal unanimously agrees that the Portland Channel is the Channel which runs from about 55° 56′ NL and passes to the north of Pearse and Wales Islands.

A majority of the Tribunal that is to say Lord Alverstone Mr Root Mr Lodge and Mr Turner decides that the Portland Channel after passing to the north of Wales Island is the channel between Wales Island and Sitklan Island called Tongass Channel. The Portland Channel above mentioned is marked throughout its length by a dotted red line from the point B to the point marked C on the map signed in duplicate by the members of the Tribunal at the time of signing their decision.

In answer to the *third* question

A majority of the Tribunal that is to say Lord Alverstone Mr Root Mr Lodge and Mr Turner decides that the course of the line from the point of commencement to the entrance to Portland Channel is the line marked A B in red on the aforesaid map.

In answer to the *fourth* question

A majority of the Tribunal that is to say Lord Alverstone Mr Root Mr Lodge and Mr Turner decides that the point to which the line is to be drawn from the head of the Portland Channel is the point on the 56th parallel of latitude marked D on the aforesaid map and the course which the line should follow is drawn from C to D on the aforesaid map.

In answer to the *fifth* question

A majority of the Tribunal that is to say Lord Alverstone Mr Root Mr Lodge and Mr Turner decides that the answer to the above question is in the affirmative

Question five having been answered in the affirmative question *six* requires no answer.

In answer to the *seventh* question

A majority of the Tribunal that is to say Lord Alverstone, Mr Root, Mr Lodge and Mr Turner decides that the mountains marked S on the aforesaid map are the mountains referred to as situated parallel to the coast on that part of the coast where such mountains marked S are situated and that between the points marked P (mountain marked S 8,000) on the north and the point marked T (mountain marked S 7,950) in the absence of further survey the evidence is not sufficient to enable the Tribunal to say which are the mountains parallel to the coast within the meaning of the Treaty.

In witness whereof we have signed the above written decision upon the questions submitted to us.

Signed in duplicate this twentieth day of October 1903.

ALVERSTONE.
ELIHU ROOT
HENRY CABOT LODGE
GEORGE TURNER

Witness
REGINALD TOWER :
Secretary.

THE RECLAMATION OF THE WEST*

By F. H. Newell,

In Charge of the Hydrographic Branch and Chief Engineer of the Reclamation Service, U. S. Geological Survey.

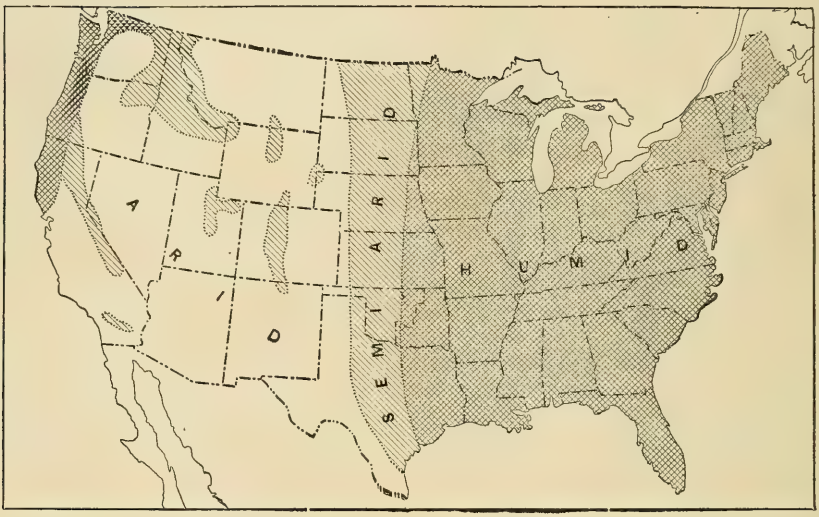
CONGRESS, in the spring of 1902, following the recommendations made by President Roosevelt in his first message, took up the matter of the reclamation of the arid West and on the 17th of June, a day celebrated in American history, the President signed the bill known as the reclamation law, setting aside the proceeds from the disposal of public lands in thirteen western states and three territories for the construction of irrigation works. At that time the matter attracted little attention other than from those who were interested in the measure. It was thought to be simply a western scheme which had been successfully lobbied through against the opposition of the leaders of both parties. As time has gone on the people of the country have begun to appreciate more and more the importance of the law not only to the West but to the country as a whole. It is now appreciated that if that law is well administered it will mean much to the future development of our country and a complete change in some physical and economic features.

As geographers we are interested in the development of the country and in the changes that take place, and as citizens of the United States we are concerned in seeing that every resource is put to its best use, and that the country is developed to the fullest possible extent. The object of the reclamation law is primarily to put the public domain into the hands of small land owners—men who live upon the land, support themselves, make prosperous homes, and become purchasers of the goods manufactured in the East and the cotton raised in the South. At the same time this is to be done in such a way that it will not become a burden to the taxpayers.

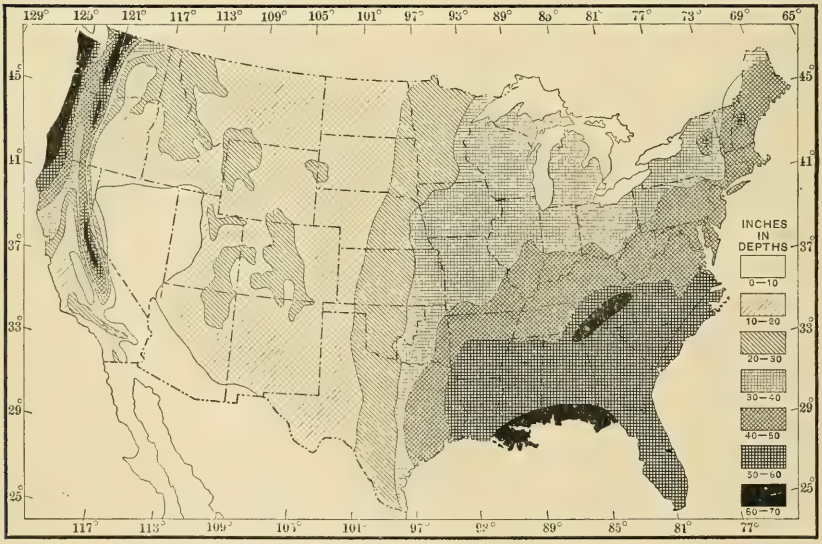
The money for the reclamation fund is from the disposal of public lands in the West. This money is returned again to the fund by repayment by the persons who are directly benefited. This matter of refunding is one of the most essential features of the law. Many considered this provision as trivial, but the more the effect of the law is studied the more thoroughly is it demonstrated that this repayment is one of the best safeguards of the law, keeping the administration clean and business-like. The requirement that each project must be worth what it costs is a safeguard both in public and in private undertakings. Attacks upon the law have been made under the misconception that the eastern farmer is taxed to make western farms valuable, and that the government will be victimized by the lands passing into the hands of great corporations. These attacks would not be made if the men who utter them would read the law. It is carefully guarded in every respect, putting the lands into the hands of small owners and refunding to the treasury the cost of reclaiming the land.

This matter of irrigation and of western reclamation is by no means new. It has been discussed most thoroughly and persistently by one of our prominent members now gone before, John Wesley Powell. "The Major," as we all called him, in his early years made extensive explorations in the West, studying its topography, geog-

*An address before the National Geographic Society, November 6, 1903.



No. 1. Map showing Arid, Semi-Arid, and Humid Regions of the United States



No. 2. Map showing Mean Annual Rainfall in the United States

No. 3. Map showing Arid Regions of the World—the Humid Regions shown in Black

raphy, and geology. In the course of those researches he became greatly impressed with the great opportunities for development of this western arid land. He talked this matter in season and out of season, and many of his friends have said, "Now, Major, if you will only stop this irrigation talk we will do anything you want, but we can not have that." We are glad that he lived to see this law passed, and though it was not exactly on the lines he sketched in his original thesis, yet it follows his ideals. His report, written in 1876, is still one of the classics to which all refer.

BROAD PROVISIONS OF RECLAMATION LAW

The reclamation law is familiar to some of you, and there are here some men who have worked vigorously for it and who led the debate in Congress. It is sufficient to go briefly over some of the general provisions of this law. It commits to executive discretion nearly all of the details which make a law a success or a failure. It sets up a few large and important safeguards, and says in effect to the Secretary of the Interior, "Here is this money; take it and spend it for this purpose; get it back in the treasury and do the best you can with it." That is unquestionably the ideal condition, and the men who are working under it must make it a success. They have no excuse for a failure. Congress has been liberal, has given the Secretary wide discretion, and we have no apparent excuse for not obtaining the best possible results which the conditions will permit.

I have spoken of two or three of the large safeguards imposed, namely, the putting of the land into the hands of small owners who will live on it and cultivate it, and the refunding of the money to the treasury, the money to be used over and over again in a revolving fund. When the law was passed the matter did not seem very important. The amount of money involved did not seem large and the opponents of the bill had little appreciation of the situation. It covered into the treasury funds for the year 1901 and succeeding

No. 4. Map showing Location of Vacant Public Lands

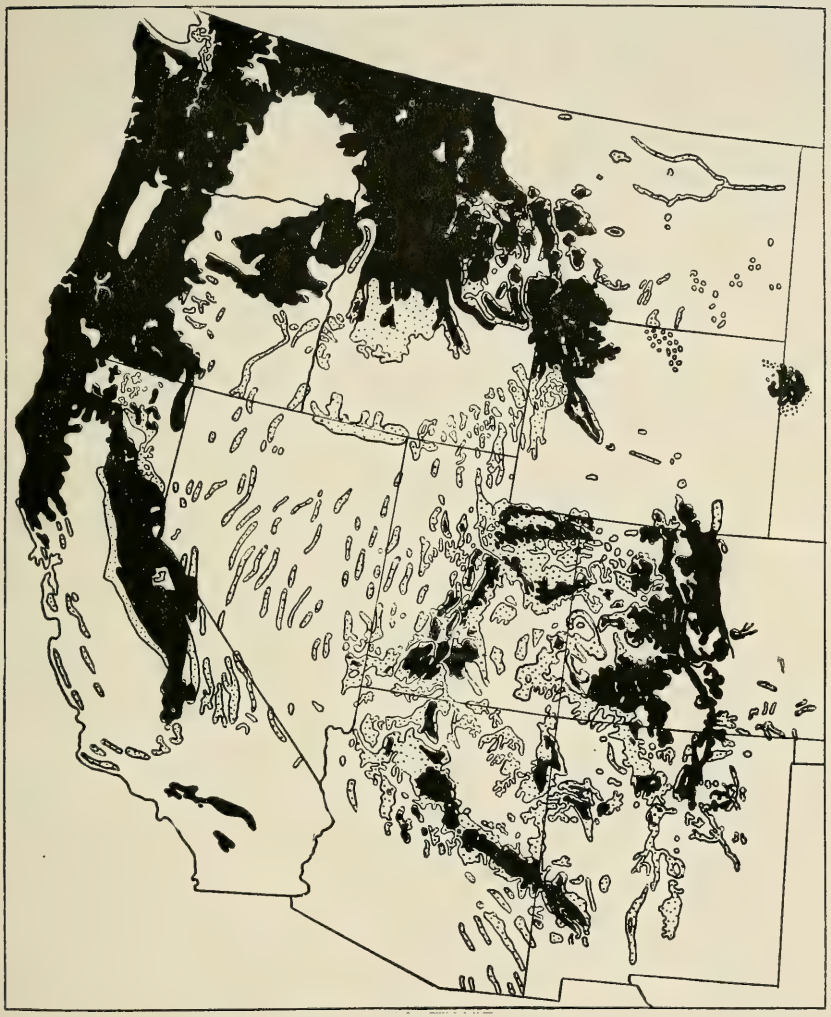
years, as follows: For 1901, $3,000,000; for 1902, $4,000,000 more, and for 1903 about $8,000,000; in all, now about $15,000,000. The fund at the present time is increasing rapidly.

THE RECLAMATION SERVICE

The Secretary of the Interior, to whom the whole matter is committed, in commencing the work, decided to put it in the hands of a man and an organization in whom he had and has confidence. Hon. Charles D. Walcott, Director of the U. S. Geological Survey, is the man whom the Secretary holds responsible for this work. He in turn is assisted by several men who since 1888 have been measuring the streams of the West, studying the water supply, and making an examination to ascertain how the lands can be reclaimed by irrigation.

The Geological Survey has for years been making a topographic map of the United States, and on that map are shown the streams, the reservoir sites in or near the mountains, and many other facts which are essential to a practical knowledge of the subject.

In addition to the topographic branch, the hydrographic division has been measuring the waters which may be



No. 5. Map showing Location of Forests and Woodlands of the West—Forests in Black, Woodlands Dotted

used or stored in these reservoirs. It was practicable to take experienced men out of the corps existing in the Geological Survey and to add to these from time to time, through civil service examinations, men who are experienced in the actual construction and operation of the work. Now there is an engineer corps of about 300 men, mostly young and active. A few have obtained age and maturity of judgment and will hold these younger men in check. The men are grouped in districts. At the head of each district is a man of experience who has been state engineer, as in the case of Idaho, or has had large experience in irrigation work. To him are assigned men who have had more or less experience. The plans made by these engineers are submitted to a board of

No. 6. Map of Irrigated and Irrigable Lands—Irrigated Areas in Black, Irrigable Areas Dotted

consulting engineers, comprising men of wide experience.

The work extends over thirteen states and three territories. These sixteen political divisions comprise the largest of the United States excepting Texas. Texas came into the Union as an independent republic, owning its vacant lands, and hence the land laws of the rest of the states are not applicable, nor is the law of June 17, 1902, but all of the large western states are included, aggregating an area of about one-half of the United States. Thus the development of nearly half of the United States is resting upon the best execution of this law.

The problems are not merely engineering. It is not sufficient to build canals and bring the water where the people can get it; but, more than this, there are an infinity of problems to be solved, and great tact must be used with people. When it comes to the question

No. 7. Map showing Approximate Location and Extent of Open Range in the United States

"The stock raising or grazing industry will always occupy 80 or 90 per cent of the arid lands of the West"

of dealing with water, men may be good citizens, but they can not be implicitly trusted when it comes to the question of water distribution. In Idaho they have the term "winter friendship." During the summer every man is at war with his neighbor over the division of water, but in the winter these troubles are forgotten and every one is on friendly terms. Summer is the time of storm and strife. So, in everything having to do with water, engineers must have not only knowledge but good sense, tact, and firmness.

To deal with the interests which are coming up in the distribution of water and the reclamation of land, it is necessary to organize the people into associations. These associations under the law must ultimately control and operate the works; through them the Secretary of the Interior can deal directly with a body of people, and they can divide the water among themselves and settle minor matters as best they can. The reclamation of the West is not only a scientific problem, but involves great tact and skill in administration.

THE PUBLIC LANDS

The public lands are of many kinds; from densely forested mountain slopes reaching up to the high mountains of the Rockies down to the vast low plains and deserts. Particular interest is attached to these high mountains and the forested slopes, for upon these depend to a large extent the future prosperity and the utilization of the agricultural lands of the West.

An Abandoned House on an Unirrigated Plain

The picture illustrates the impossibility of establishing homes on the public domain without first providing methods of irrigation

The extent of the forests is shown by diagram 5. In northern California and along the Pacific coast, in western Oregon and Washington, are the greatest forests remaining in the United States. Around the Yellowstone National Park and in the Rocky Mountain region in general are other important forests. In considering any question concerning the forests we must bear in mind that the word forest comprises a great variety of tree growth. In the East it usually means a dense growth. Out in Colorado or Wyoming you can sometimes see a half mile through what is called a forest. Thus, when we discuss forests on the public lands there must be some explanation of what kind of a forest we are talking about, if we are to be correctly understood.

A little scrubby growth of cedar or piñon may have great value to the pioneer, although it is not merchantable timber. These small trees furnish the poles and the posts which are so necessary to the settler. Even the small brush may supply the fuel which he must have for his home.

The present distribution of the public lands is exhibited by diagram 4. In black are the lands which have been taken up by individuals. Much of this public land is now used for grazing, but there are many thousand acres which with water will support hundreds of prosperous homes. In the extreme east of Colorado settlements have been made by what are called "the rain belters," who came into the dry country in the belief that the so-called "rain belt" would shift westerly as settlement progressed.

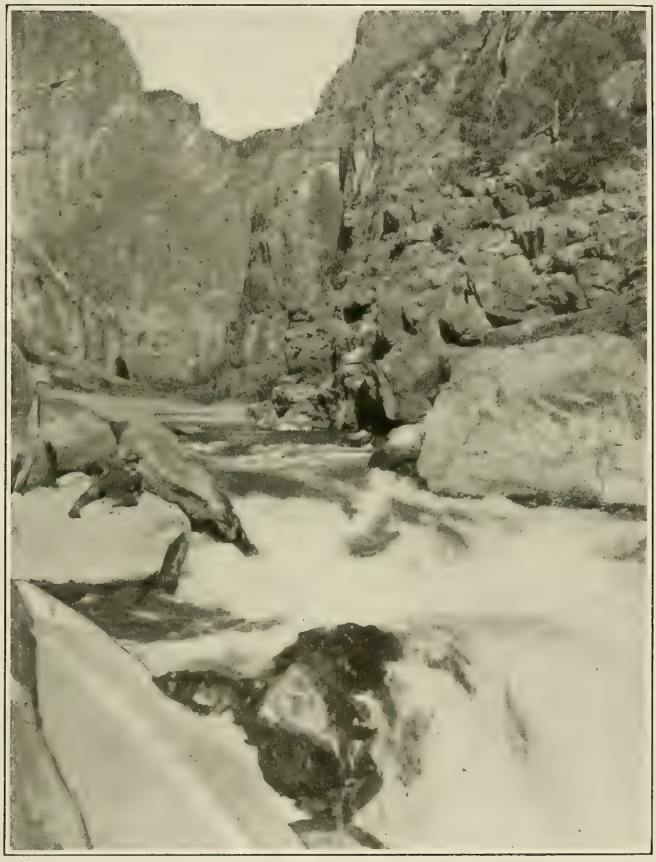
AREA WHICH CAN BE RECLAIMED

The area of land which can be reclaimed by irrigation is relatively small. If two or three per cent of the vast extent of arid lands of the United States are ultimately reclaimed and put under

cultivation, it will mean a population in the western half of the United States almost as great as that now in the eastern half of the country. Figure 6 shows the areas where it is probable that irrigation can be carried on, or where it is now being carried on and where it can further be extended. If the West is developed to the extent that all these patches indicate, we will have a wonderful change in the social and commercial relations of the United States as a whole.

The comparatively regular distribution of these irrigable lands in each state is notable. The entire extent of irrigation development in each state is of course very small, but if I am correctly informed, the proceeds from the small irrigated area in Colorado are already greater than from the mines.

While it is not likely that a very large proportion of the arid West will ever be reclaimed, yet nearly all the land has value in one way or another. The stock raising or grazing industry will always occupy eighty or ninety per cent of the arid lands of the West. It is the great industry as far as area is concerned, but in value of products is not as great as is the cultivation of the soil.



Top of Torrence Falls, Gunnison Canyon

Attempts to go down Gunnison Canyon by boats having been unsuccessful, Mr Fellows, an engineer of the Reclamation Service, and an assistant, by floating, swimming, and climbing for ten days succeeded in getting through and locating the site of the tunnel (page 27).

THE RECLAMATION FUND

The reclamation fund comes from the disposal of lands in thirteen states and three territories, and the amount is different widely in the different states. The law provides that so far as practicable the amount shall be spent in the state where it originates, but in fact the available funds are almost always inversely apportioned to the needs of any one state.

From Nevada, the state having the largest opportunity for development, the amount of money is represented by

a small amount, while from North Dakota there has come an enormous fund. In the latter state there is little possibility of development by irrigation because of the difficulty of finding irrigable lands and an adequate water supply. North Dakota and Oregon and Oklahoma have large funds. In Oklahoma, with its subhumid climate, there is little need of irrigation development, and in fact it is almost impossible to find any reclamation project of considerable magnitude in that territory.

Floating through Gunnison Channel, Using a Rubber Bed as a Raft (page 27)

PRESENT RECLAMATION WORK

Examinations leading to construction are being carried on widely. At the points where dams may be erected for water storage the foundations must be studied, and for this purpose diamond drills are used to ascertain the character of the bed rock. Work of construction has been begun in two localities—one in Nevada and the other in Arizona. In Nevada the work in hand is that on a canal to take water from Truckee River into lower Carson reservoir site. Lake Tahoe, at the head of the Truckee River, is the highest large lake in the United States and in many respects is an ideal reservoir site, and its waters if wisely used will go far to promote the prosperity of Nevada.

In California, over the state line from Nevada, are opportunities for water storage. In the mountains are little valleys in which water can be held. It is impossible for Nevada, as a state, to utilize these reservoir sites, as it cannot go across the state line. The national government is alone capable of doing this work.

A dam put across Carson River near its lower end will flood back the water and make an immense reservoir, capable of supplying several hundred thousand acres of land which is now absolutely desert and almost impossible to cross.

The interstate character of these problems of reclamation is exceedingly complicated. The Rio Grande, rising in Colorado and flowing through New Mexico, forms the boundary between Texas and Mexico; the Arkansas rises in Colorado and flows through Kansas, Oklahoma, Indian Territory, and Arkansas; the South Platte and North Platte flow from Wyoming into Nebraska; the head waters of the Colorado rise in Colorado, flow through Utah, and form the bound-

"We floated, paddled, and waded 400 miles down the stream, under the most delightful climate of the United States"

There are many square miles of rich bottom land along the Colorado River capable of high cultivation if reclaimed

Red Canyon of the Colorado River

Where the United States may build a great storage dam, similar to the great dams at Assiut and Assûan in Egypt

ary between Arizona and California. Nearly all the important rivers of the arid West rise either in Colorado or Wyoming, in the mountain ranges crossing these states, and flow out from these states, furnishing water for adjoining states. This interstate character of the streams has been held as one of the reasons for federal intervention in reclamation, as well as the fact of federal ownership of the vacant lands.

GUNNISON RIVER PROJECT

In Colorado the largest project now in construction is that of taking the Gunnison River into the Uncompahgre Valley. This river flows in a narrow canyon two thousand feet deep. This canyon has been regarded as impassable, but Mr A. L. Fellows, one of the engineers of the reclamation service, and an assistant went through in 1902 at the risk of their lives. The attempt had been made a number of times to go down it by boats, but without success. These men did it by means of swimming and by using a pneumatic mattress or rubber bed as a raft. They put in small rubber bags the necessary food and a little underwear. In ten days, by floating, swimming, and climbing, they succeeded in getting through and locating the point at which may be located the headworks to take the water out by a tunnel into Uncompahgre Valley.

The tunnel, heading in the steep cliffs, continues near the river for three or four miles in order to gain grade, and then passes through the mountain to the valley beyond. Careful surveys and examinations are being made, and it is believed to be feasible to build the tunnel, if enough irrigable land can be found to justify the undertaking.

Another project which has been under examination is that in southern Wyoming on the North Platte River, at what is known as the Devils Gate, on Sweetwater River, a short distance above the point where it enters North Platte River.

The Present Water Supply System of Phœnix, Arizona

There are thousands of acres of reclaimable land near Phœnix which are capable of producing sometimes seven crops a year.

Unfortunately the amount of water available at this point is small, and after careful examination, there is now being considered another reservoir site at a lower point, where there is ample water for storage purposes. This is on North Platte River itself, below the mouth of Sweetwater River.

In northern Wyoming there is another reclamation project, that on Shoshone River, which here flows through a granite range. Surveys are being made to demonstrate the practicability of diverting this river and carrying it out to the broad plains of the Big Horn basin.

THE COLORADO RIVER

One of the greatest works in the United States is the utilization of the great Colorado River of the West. The head waters come from Wyoming and Colorado, flow through Utah and northern Arizona, and the river finally enters the Gulf of California. Along this stream are lands capable of high cultivation, as the soil is rich and the climate semi-tropical.

The rank growth on the bottom lands shows that wherever water is found the vegetation is extremely dense. It is, in fact, almost impossible to push one's way through this vegetation. The illustration on page 25 shows some of the broad bottoms that can be reclaimed.

The river itself is constantly changing, shifting over a very broad extent of channel. Last Christmas I took a trip down the river in a boat, and we floated, paddled, and waded for four hundred miles down that stream, under the most delightful climate in the United States. It was a wonderfully delightful experience. We would be sailing under a good breeze, at an exhilarating rate, and everybody would be gay, when suddenly we would hang up on a mud bank; then all would go overboard. We would push off into deeper water, and then on until we brought up in another mud bank.

Page 26 shows where it will be possible to build dams similar to those built by the British engineers on the Nile. The river, although a quarter or a half a mile wide above, here becomes narrow, hardly wide enough for a steamer to pass, and at this point it would be possible to erect dams holding back the water. The great difficulty is the fact that the mud carried by the river would fill the reservoirs very rapidly.

THE SALT RIVER

Another project under consideration is in Arizona, on Salt River. This dam, if constructed, will be one of the greatest in the world, being 230 feet from foundation to top. The lands to be reclaimed along the Salt River are in the vicinity of Phœnix and are capable of a high degree of cultivation, producing crop after crop throughout the year. There are sometimes as many as seven crops a year raised.

In southern Idaho are vast tracts of desert land, to which water may be brought from Snake River. At the head of this river is Jackson Lake, situated at the foot of the Grand Tetons. By closing the outlet of this lake all the water can be held, storing a sufficient supply for tens of thousands of acres along Snake River, in Idaho.

Under present conditions the water supply in Snake River dwindles to such an extent that during the summer the channel is dry at points along its course. This river, which appears to be inexhaustible, is as a matter of fact nearly dry at points in eastern Idaho for several months when the water is most needed.

A great project under consideration is is that of taking water out of some of the tributaries of the Columbia. Millions of acres susceptible of irrigation are below the level of the headwaters of Columbia River, but in order to convey these waters to the dry lands it is necessary to traverse mile after mile of steep side slopes. The cost of the project runs up into the millions of dollars; so that while the government may execute it in the future, the project of reclaiming the great arid lands of the State of Washington is one which is almost impossible for the present time.

In the region of the Black Hills of South Dakota and Wyoming are numerous small projects. Many streams flow outwardly from the hills through narrow canyons. By closing these gaps it is possible to hold water in various places around the Black Hills. Beyond are vast stretches of rolling country

susceptible of reclamation. In the northern part of the region is one of the largest and best bodies of public lands to which it is practicable to take water. Here on Belle Fourche River are many thousand acres of public land which may be irrigated.

The theory of reclamation is to conserve the flood waters that otherwise go to waste and hold them until such time as they are needed. There is still a vast extent of arid lands to which the flood waters can be carried and which, when watered, is capable of producing large crops and furnishing homes for prosperous farmers.

General George M. Sternberg: I would like to ask whether, in case a channel is opened and water brought across from Canada, under international law Canada would have any claim against us for taking away her water supply.

Mr Newell: It would open up the great question of water law, and I would say in response that the principle has been established that priority of appropriation gives priority of right. The man who first takes water and puts it to beneficial use, provided he complies with certain requirements, is entitled to it. In the East, if you have a stream flowing through your farm; even though you do not use it, you are entitled to have that water go through your farm, but in the western states, if you take the water and put it to beneficial use, you can continue to do so, but if you do not, any one who can put it to good use is allowed to do so The development of the arid country would be absolutely impossible if it were necessary for the waters to flow down undiminished in quantity and quality as in the eastern states.

Acting President W J McGee: The chair is confident that the members of the Society would be glad to hear from several persons present who could speak from experience on the great problem. The Director of the Geological Survey, under whose responsibility the work has been conducted, is with us. There are others with us who have been acquainted with the practical aspect and also the theoretical aspect of irrigation for many years.

Hon. Charles D. Walcott: I think Mr Newell has given a very clear idea of the irrigation law and its operation. I will say that when the question came up in 1894, when I took charge of the Survey, of renewing the work, I asked Major Powell who was the best man to do it. He says, "We have a man named Newell, who is now in the West. Send for him, and if started with him, I think it will go on well."

After the irrigation law passed, the Secretary of the Interior and the President asked who was the man to place it in charge of. I told them that I knew of no one so well qualified by training and experience and other qualifications as Mr Newell. He said tonight I am responsible to the Secretary of the Interior. Mr Newell has charge of that work, and I hold him responsible, and I am simply one who will help him as far as I can, but the responsibility of the work and carrying it on rests upon his shoulders.

Mr Newell: One of the gentlemen who fought for the bill on the floor of the House is here, and I would ask that we may hear from Mr Mondell, of Wyoming. He was in charge of the reclamation bill at the time of its passage in the House of Representaves.

Hon. F. M. Mondell, Representative from Wyoming and chairman of the Committee on Irrigation of the House of Representatives: I have been very much interested indeed in Mr Newell's lecture and these beautiful and instructive views he has thrown upon the screen. We of the West are vastly interested in the irrigation work of the national government. I have worked in Congress and out of Congress for a good many years to accomplish the passage of a law which I am pleased to know the gentlemen of the Reclamation Service are finding to be a law comprehensive enough to cover practically all the conditions which exist in the western countries.

Irrigation in America is not a new thing by any means. The Indians practiced it many hundreds of years ago in the Southwest, the Spaniards later, the Americans again in the forties, and private enterprise has moved along a good many ways in the development of the smaller projects of irrigation throughout the arid regions. But there are many large tracts beyond the possibility of development by private enterprise, where there are many complications by reason of the rivers flowing through two or more states, as Mr Newell has said this evening, and enterprises costing so much, irrigating such vast amounts of land that it seemed necessary that these works should be taken up by the federal government. The agitation, taken up many years ago for the undertaking of the work by the national government, resulted finally in the passage of the irrigation bill.

We are exceedingly fortunate that the administration of the law has fallen in good hands—exceedingly fortunate. The people of the West have great confidence in the Director of the Geological Survey and in Mr Newell and the most efficient corps of engineers which has been organized under his direction. The work is starting most auspiciously. It is true that

our people do at times become a little insistent that the work shall be immediately inaugurated in each and every one of the sixteen states and territories embraced within the provisions of the law, but, in the main, they are very well satisfied with the development that has been made. Rapid progress has been made in engineering and in the general work of looking over the projects in all of the states and territories interested and we are hopeful that within a very few years a vast extent of territory in the western country will be developed by means of the national irrigation law and under the administration of Mr Newell and Mr Walcott.

Acting President McGee: The chair would like to call attention to the fact that in addition to the gentlemen who have been mentioned as competent and far-sighted public officers, competent thoroughly to deal with the greatest engineering project that has ever been undertaken, an enterprise which includes not only engineering, but also the development of ideas and new theories in matters of law, the fact that there are still other citizens of the country who have done most effective work in this great reclamation service. One of our statesmen, one of the most active and energetic among the workers for the law recently enacted, has spoken to us. There are many others, and among these we must not forget the vigorous Chief Magistrate of the land, who has for the whole of his administration been one of the most earnest and successful advocates of this new law which gives the people of the United States a new outlook for the powers and resources of nature.

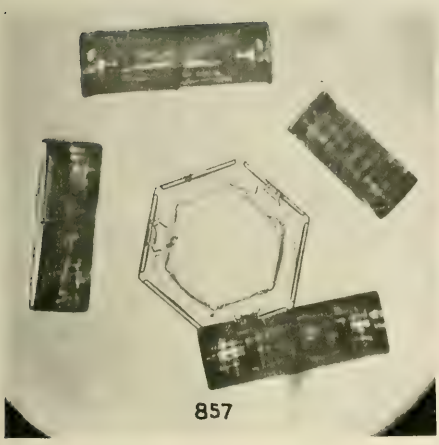
SNOW CRYSTALS

THE wonderfully beautiful and intricate designs of snow crystals have long excited admiration. Various students have made detailed investigations of their extraordinary form and have published drawings of what they look like when magnified, but the most remarkable collection of actual photographs of these crystals (technically, photomicrographs) is in the possession of Mr Wilson A. Bentley, of Jericho, Vermont. Mr Bentley has been making a special study of snow crystals during 20 years. He has photographed many hundreds of them, and has now in his collection more than 1,000 photomicrographs, no two of which are alike. In the Monthly Weather Review he recently published an exhaustive account of the results of his investigations. To this report the NATIONAL GEOGRAPHIC MAGAZINE is indebted for the following facts and also for the beautiful illustrations of snow crystals which accompany this article.*

* "Studies among the Snow Crystals during the winter of 1901–'2, with additional data collected during previous winters." With 300 illustrations of Snow Crystals. By Wilson A. Bentley. Annual summary of the *Monthly Weather Review* for 1902. Vol. 30, No. 13.

Snow crystals are divided into two great classes: those *columnar* in form, No. 857, and those of a *tabular* form, No. 716. These two fundamental types are in turn divided into many subvarieties. No. 709, possessing a solid tabular nucleus surrounded by more or less open structure, is called *stellar*, while No. 920, which has an open central nucleus and resembles a fern, is called *fern stellar;* No. 746 is of a solid tabular form, named *lamellar;* No. 580 consists of columnar forms connecting solid tabular nuclei, and are called *doublets*. The extremely long needleshaped forms of No. 700 are designated as *needleshaped* or *needilar*. Crystals with granular coatings, as 807, are called *granular*. These are the most common form; then come the fern-stellar, 920, the stellar, 709, and the solid tabular, 746, while the columnar, 857, the needleshaped, 700, and lastly the doublets, 580, are the most rare types.

The forms vary according to the wind, the height of the clouds, the degree of cold, the amount of water in the air, etc. Crystals formed in cold weather or in high clouds are usually columnar, No. 857, or solid tabular, No. 850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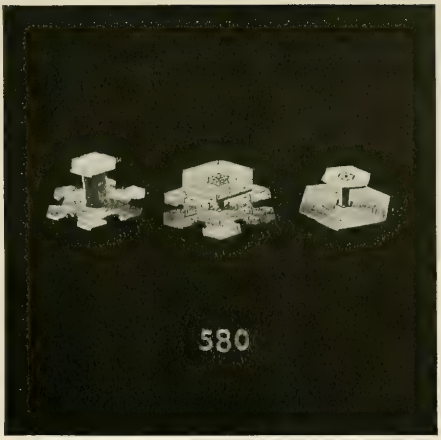
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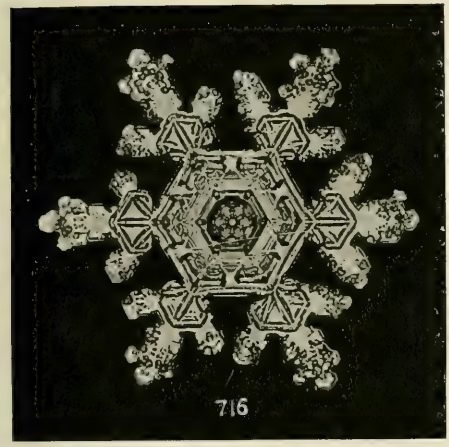
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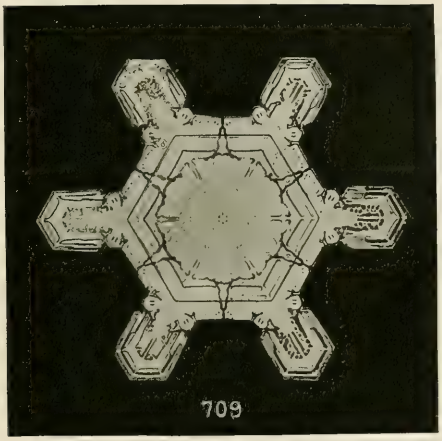
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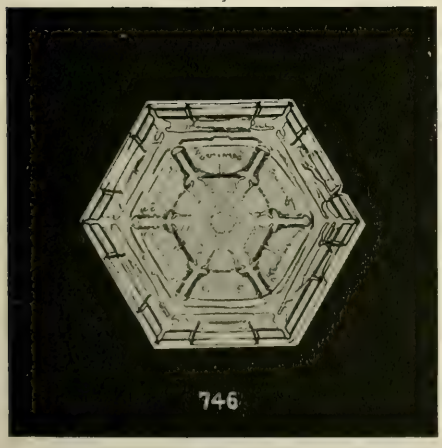
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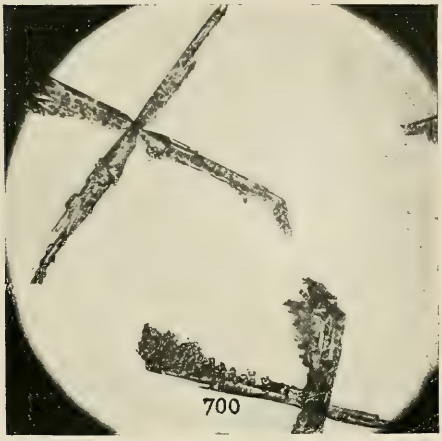
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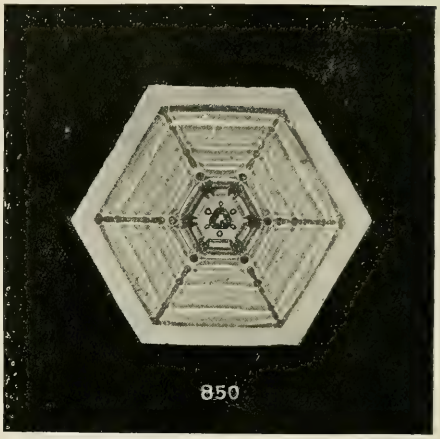
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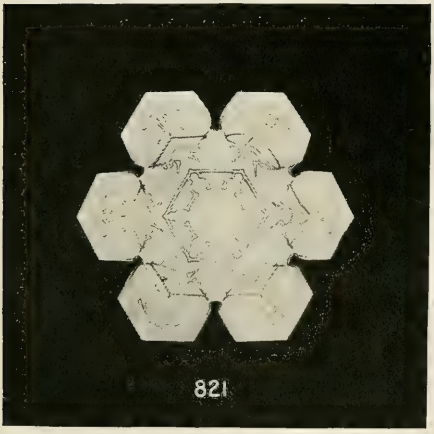
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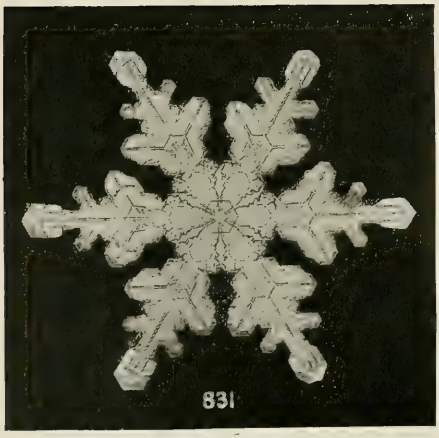
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702

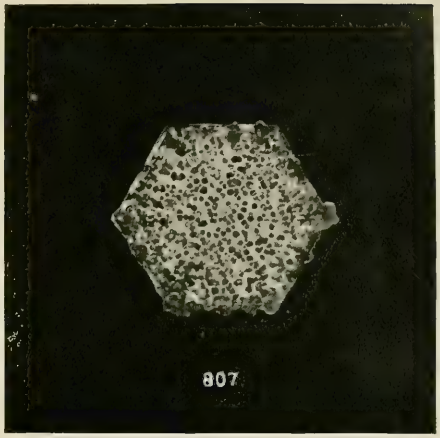
Those formed in moderate weather and light winds or in low clouds are apt to have frail branches and to be of a feathery type, No. 920; mixed forms, Nos. 821 and 831, grew partly in low and partly in high clouds. High winds give broken and irregular forms, and much moisture the very granular crystals, No. 807.

These heavy granular-covered crystals are peculiarly a product of the lower or intermediate cloud strata, and especially of moist snow storms. In intense cold they are rare, while the columnar and solid tabular then become common.

About four-fifths of the perfect forms occur within the west and north quadrants of great storms.

The most common forms outlined within the nuclear or central portions of the crystals are a simple star of six rays, a solid hexagon, and a circle. The subsequent additions assume a bewildering variety of shapes, each of which usually differs widely from the one that preceded it and from the primitive nuclear form at its center.

By bearing in mind the fact that crystals evolved within the upper clouds tend toward solidity, and the crystals formed in lower clouds tend toward open branches and feathery forms, it is possible to trace the history and travels of a great many of the crystals. No. 821 was probably star-shaped at birth and was formed in low clouds. Ascending air currents carried it upward until it reached a considerable height, where it assumed the solid hexagonal form which we see outlined around the star-shaped nucleus. Its greater weight now caused it to descend to lower levels, where it acquired still further growth. No. 831 originated at a high altitude, then descended, and completed its growth entirely at low levels. No. 850 originated in and was also completed in the upper clouds. No. 920 was born and matured entirely in lower clouds. No. 565 was probably formed on a long broken branch.



Columnar forms like 857 or solid tabular, 746, are naturally heavier than the open forms; they are not therefore likely to be wafted about in so many directions and hence to be modified and become so intricate as the light, feathery crystals.

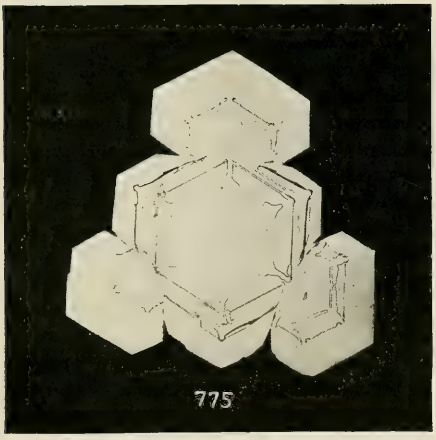
No. 702 is one of the oddest and most remarkable crystals ever photographed. By some extraordinary combination of circumstances, during the latter stages of its growth the aqueous material of which it was built was apparently brought to it from one direction only.

The perfect symmetry of Nos. 785 and 792 greatly resembles, in ideal perfection, the beautiful drawings of the English observers Scoresby and Glaisher, and leads us to think that, contrary to the conclusions reached by some recent observers, such drawings may be quite true to nature and more reliable than we have been led to suppose.

No. 785 is considered by the author the peer of any in his whole collection; No. 735, a beautiful starfish design, is a somewhat rare form. Prof. S. Squinabol, of the University of Padua, made drawings of a snow crystal found in Genoa in 1887 that closely resembles this form. Mr Bentley does not attempt to explain the delicate, beautiful, and unique central details of No. 779.

562½

779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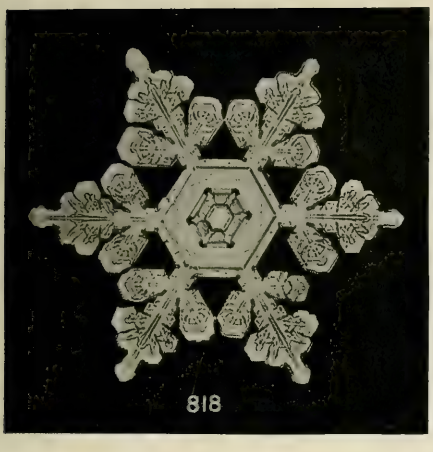
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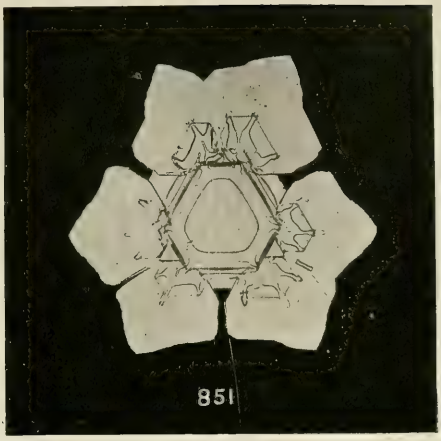
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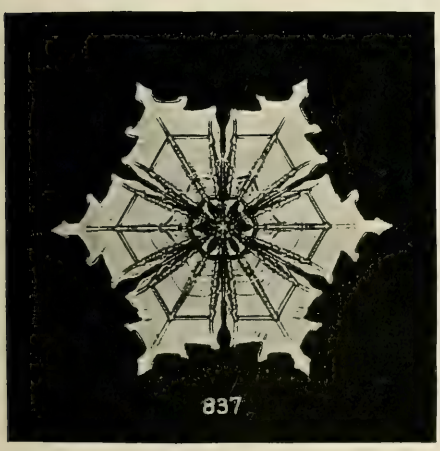
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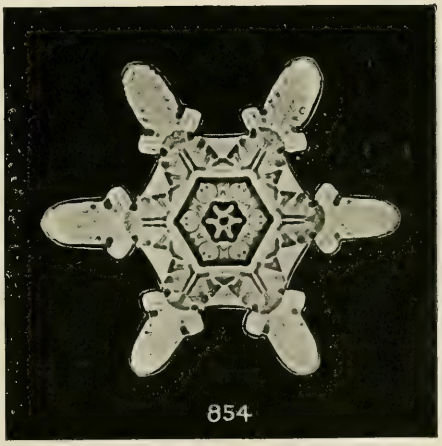
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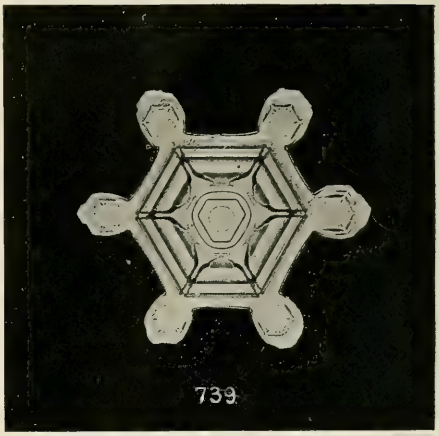
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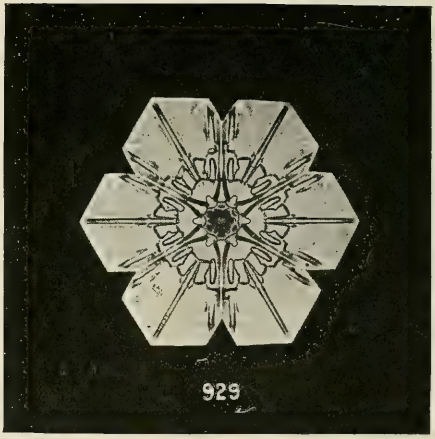
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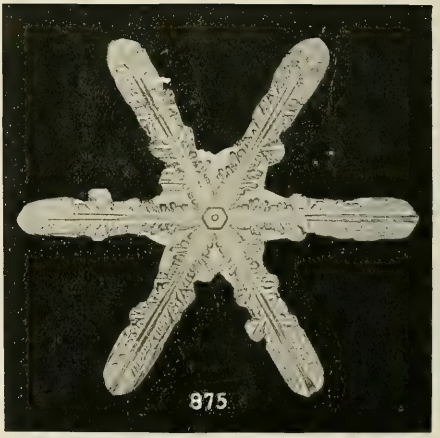

875

Perfect crystals are frequently covered over and lines of beauty obliterated by such granular coatings as are shown in 807. Such heavy granular-covered crystals possess great interest for many reasons: They show when the character of the snow is due to the aggregation of relatively coarse cloud particles or minute rain drops, and not to the aggregation of the much smaller molecules of water presumably floating freely about between them. They also offer a complete explanation of the formation and growth of the very large rain drops that often fall from thunder clouds and other rain storms, if we accept the conclusion that such large drops result from the melting or merging together of one or more of the large granular crystals.

While most granular forms possess true crystallic nuclei, there is reason to suppose that they sometimes form directly from the particles of cloud or mist.

HOW THE DESIGNS ORIGINATE

The beautiful details, the lines, rods, flowery geometrical tracings, and delicate symmetrically arranged shadings to be found within the interior portions of most of the more compact tabular crystals, and in less degree within the more open ones, are due to minute inclusions of air. This included air prevents a complete joining of the water molecules; the walls of the resultant air tubes cause the absorption and refraction of a part of the rays of light entering the crystal; hence those portions appear darker by transmitted light than do the other portions. The softer and broader interior shadings may perhaps also be due, in whole or in part, to the same cause, but if so, the corresponding inclusions of air must necessarily be much more attenuated and more widely diffused than in the former cases. We can only conjecture as to the manner in which these minute air tubes and blisters are formed.

As no one can ever actually see the extremely minute water particles rush together and form themselves into snow crystals, the material and the manner in which the molecules of water are joined to form snow crystals is largely a matter of speculation. While it is true that the snow crystals form within the clouds, it does not therefore follow that they are formed from the coarse particles of which the clouds are composed in cold weather.

We have good grounds for assuming that the true snow crystals are formed directly from the minute invisible atoms or molecules of water in the air, and not from the coarse particles in the clouds, as it is unlikely that these coarse particles could unite into snow crystals in so perfect a manner as to leave no trace of their union even when examined under powerful microscopes.

THE U. S. WEATHER BUREAU*

BY HON. JAMES WILSON, SECRETARY OF AGRICULTURE

THE year 1902–'03 marks a distinct advance by the Weather Bureau in the science of meteorology, especially in two directions. From the beginning of the weather forecasts of the government, in 1871, the necessary observations at the several stations have always been reduced to the sea-level plane. It was conceived some years ago that the numerous defects in

* From the Report of the Secretary of Agriculture, Hon. James Wilson, for 1903.

forecasting might be diminished, and the uncertainty as to the true cause of storms removed, if similar daily charts were also constructed at higher levels, for which purpose the 3,500-foot and the 10,000-foot planes were selected. After much laborious computation, as shown in the barometry report of 1900–1901, the necessary reductions were made, and we now possess daily weather charts on the three planes mentioned. The study of these supplementary maps is going on, with encouraging prospects of more reliable forecasts of the weather conditions, and it is hoped by January 1, 1904, to make them a part of the regular daily work of the forecasting service. At present the improved data are confined to the barometric pressures, but it is most important to secure charts of the temperature on the two upper planes as well. Unfortunately, we have no observations of temperature in the higher atmosphere suitable for this purpose, and they can be secured only by means of numerous balloon and kite ascensions carrying the necessary self-registering instruments.

MOUNT WEATHER

It has been thought proper for many reasons to establish on the Blue Ridge Mountains, at Mount Weather, Bluemont, Va., a modern meteorological observatory of the best class for scientific research pertaining to problems of weather phenomena. A building for administration and for a school of instruction is being erected, and the plans are well advanced for a suitable power-house and shop for balloon and kite ascensions, which will be built during the coming year. The recent advances in solar and terrestrial meteorology justify us in preparing to study at first hand the variations in the solar activity, and the corresponding changes in the weather conditions, especially from season to season. It is a complex problem and will require the best instrumental equipment, the ablest students, and a long series of observations before it can be finally solved.

The desirability of being able to foresee a year in advance the type of season probable during a given period is so great as to make it imperative to lay broad scientific foundations at the beginning of the twentieth century, which will be of utility for future generations, who will surely build a great science of cosmical meteorology upon such data as can be supplied by the Mount Weather Observatory.

New submarine cables in connection with the vessel-reporting and storm-warning services have been laid from Sand Key to Key West, Fla.; from Southeast Farallone to Point Reyes, Cal.; from Block Island to Narragansett Pier, R. I., and from Glen Haven to South Manitou Island, Mich., a total of about 50 miles. Additional vessel-reporting stations have been established at Sand Key, Fla., and Southeast Farallone, Cal.

To meet the demands of the maritime and commercial interests of the Pacific coast a cable has been laid between San Francisco and the Farallone Islands, with a weather observatory and vessel-reporting station on the South Farallone Island. A wireless station has also been installed there to insure communication in future should the cable be out of order.

RIVER AND FLOOD SERVICE

The work of the river and flood service, owing to the numerous and disastrous floods that occurred, has been a prominent feature of the year. Several of the floods were the greatest of which there is authentic record, and were remarkable both for their wide extent and for their destructive character. Our warnings were prompt and timely, and in the main remarkably accurate, and in no instance was the coming of a dangerous flood unheralded. The forecasts

of the great floods of March, April, and June, 1903, afford noteworthy examples of the efficiency of this service. This should be extended to the Kansas and other rivers, where no stations have yet been established.

DISTRIBUTION OF FORECASTS AND SPECIAL WARNINGS

Inadequate appropriations have prevented any extensions in the important work of distributing forecasts and special warnings, and of necessity our efforts have been confined to maintaining the service already in operation, with its various ramifications, and adopting such suggested improvements as might be effected without additional expense.

A marked increase (nearly 20,000) is shown in the number of places receiving forecasts by telephone without expense to the Government of the United States, and with the rapid extension of "farmers' telephone lines" opportunity is afforded for placing weather information directly in the homes of the more progressive agriculturists, as well as in the telephone exchanges of rural centers of population, where it is posted for the general information of the public.

The National Climate and Crop Bulletin has been issued in the usual form, with charts showing the current temperature and precipitation, extremes of temperatures, and the departures from the normal of both temperature and precipitation. In this bulletin the current meteorological conditions are discussed in their relation to crop growth from the beginning to the end of the crop season.

EDUCATIONAL WORK

The Weather Bureau has, through its officials at the various stations throughout the country, taken an active part in public education along meteorological lines. In 12 colleges or universities during the past year Weather Bureau officials have conducted regular courses of lectures or classes of instruction in meteorology and climatology, and at 5 of these institutions the official is a member of the faculty. At 16 stations the officials have delivered occasional addresses outside of their offices to schools or colleges, and at 28 stations they have given frequent talks in their offices to pupils and teachers of schools. In 14 instances they have delivered occasional addresses outside of their offices to farmers' institutes and similar organizations. Only a few years ago there was very little instruction of this nature given in our colleges, universities, or public schools, but the demand for it has rapidly increased. The action of the Bureau in this direction will undoubtedly result in a wider knowledge and a more intelligent understanding of its work, and a consequent increase in its usefulness and value. Many of the young men who receive instruction in these classes are attracted to the service of the Bureau as an occupation, and the Bureau profits by securing a class of employés with special training and equipment.

Cotton for England—The desperate efforts England is making to grow cotton in her colonies in Africa, India, Ceylon, and Australia are described at length by the United States consul to Liverpool, James Boyle (Consular Reports, November 20, 1903, No. 1806). The recent cornering of American cotton has caused great distress in England and has made English cotton manufacturers acutely realize what will happen to them in a few years when the United States uses all the American crop. Their only hope is the possibility of the British colonies being able to supply them with cotton.

MARCUS BAKER

September 23, 1849-December 12, 1903

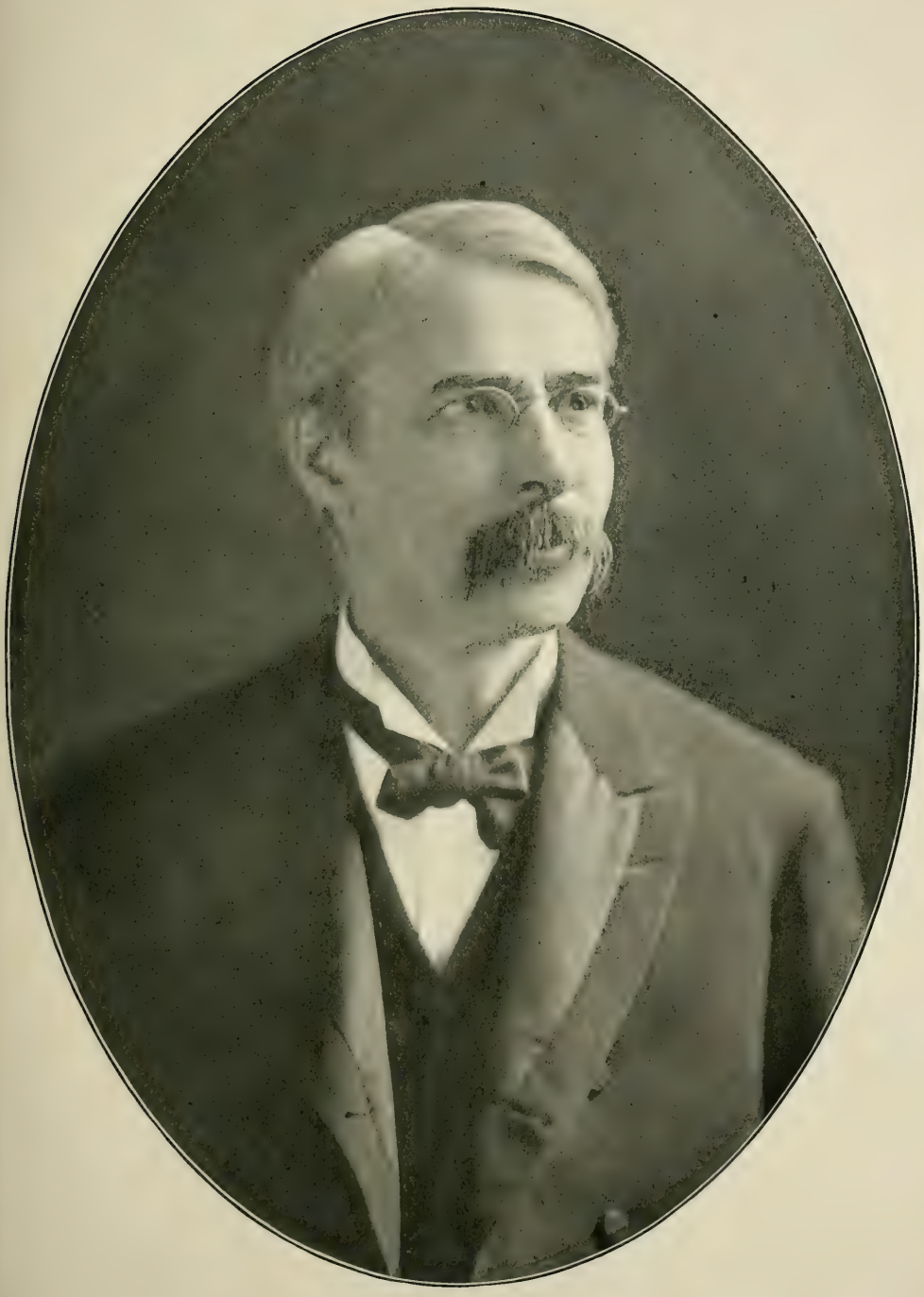
On Saturday morning, December 12, Mr Marcus Baker died very suddenly of heart failure at his residence in Washington. Mr Baker was one of the fifteen original signers of the certificate of incorporation of the National Geographic Society, January 27, 1888. He was elected a member of the Board of Managers at the first meeting of the Society and has served continuously on the Board ever since. He was a member of the Executive Committee of the Board and had for many years been chairman of the Committee on Admissions. He had given freely to the Society of his time and energy, and his exceeding good judgment had greatly helped to mould and guide the policies and purposes of the Society during the sixteen years of its history. He has left a vacancy on the Board of Managers and in the Society which it will be impossible to fill.

At a meeting of the National Geographic Society December 18, addresses in memory of Mr Baker were made by Dr Wm. H. Dall, who has known Mr Baker since he began his eminent career as a geographer in 1873, and by Dr L. A. Bauer. Dr Bauer paid a tribute to the important contributions to magnetic science by Mr Baker while Director of the U. S. Coast and Geodetic Survey Magnetic Observatory at Los Angeles. Dr Dall's address is published below:

In 1871 I undertook a geographical reconnaissance of the Aleutian region of Alaska for the U. S. Coast and Geodetic Survey. Our first season's work extended from August, 1871, to October, 1872, and on our return to San Francisco my associate, M. W. Harrington, astronomer and mathematician of the party, returned to the East. During the thirteen months we had spent on our little 75-ton surveying cutter, we had received two batches of mail. Chicago was burned, the six weeks' war on the continent took place, and we knew nothing of it for six months. Our work was carried on in a small sailing vessel. The region was practically uncharted, the existing charts known to be most imperfect, the unsurveyed waters bristling with reefs and shoals, the region one of the foggiest and most tempestuous in any ocean. We had to purchase and rebuild for our work a new vessel, guided by the fierce experiences endured in the old one. The country at that time was generally regarded as a wilderness of ice and fog. No man was likely to volunteer for work in such a region and under such conditions unless he was possessed of an adventurous spirit and a genuine interest in his work.

From the University of Michigan came a young man whose first glimpse of the ocean was through the Golden Gate. His kindly and cheerful nature and lively enthusiasm captured our affections at the start. Thoroughly based in mathematics and with a working knowledge of field astronomy, he soon mastered the difficulties of the transition from theory to practice. Penned for nine months of the year in a little cabin, elbow to elbow, one soon comes to know the inmost qualities of one's associates. There began an intimacy which was only broken by death.

Our work was very different from the ordinary surveying in an average climate. The stars were invisible a great part of the summer, owing to the high latitude. The sun was almost constantly veiled in fog or mist, and one had to take advantage of every gleam



Marcus Baker

of sunshine to obtain the most simple and necessary observations for time, latitude, and azimuth. Often with instruments set up and covered with oiled canvas we have waited hours under an umbrella in the persistent drizzle in the hope that the sun might give us five minutes free of clouds. There were no limits to our day's work, except those set by the climate and its caprices. Through three years of such experience Mr Baker was ever cheery, ever full of expedients to circumvent the perversities of the meteorological environment, and the fair measure of success we met with was largely due to him.

On our return to civilization began the task of utilizing the material obtained, by preparing it for the use of navigators in the form of charts, meteorological and tidal tables, and a Coast Pilot. Owing to the little-known character of the country the importance of bringing together the information scattered through scores of voyages, atlases, and charts was very marked. I had planned a series of such summaries: the Coast Pilot for the details of navigation, the meteorology, the observations of terrestrial magnetism, and a bibliography of charts, maps, and publications.

In all the work which this involved Mr Baker was my efficient helper. The collection and the reduction of still unpublished terrestrial magnetic observations, dating from 1740 to 1880, was almost wholly his work, and from this manuscript Mr Schott derived nearly all of the data for Alaska which he utilized in his important series of papers on the variation in the amount of declination of the magnetic needle during long periods of years. Early in the prosecution of our work I had noticed that the culmination of easterly variation for the nineteenth century in the Aleutian region had passed, and to Mr Baker was given the task of making the numerous local observations by which this important fact might be placed on an irrefragable foundation.

These labors on magnetism, bibliography, the comparisons of charts in their historical relation, and the synonymy of geographic names, which were involved in the work we did together, have always seemed to me a direct preparation for the important geographic work he accomplished later.

Our work in Alaska being interrupted, Mr Baker was placed in charge of one of the Coast Survey primary magnetic stations, with self-registering instruments, at Los Angeles, California—a work of the results of which I can only say that experts in magnetism pronounced it admirable. In 1885 he returned to Washington, where he transferred his labors to the U. S. Geological Survey, where they were chiefly geographic and concerned with the topographic and other charts issued by the Survey. He also became one of the most serviceable members of the Board of Geographic Names, formed by President Harrison to regulate the nomenclature of official publications. During a large part of his service here he was closely intimate with the late Director of the Survey, Major Powell, who warmly appreciated his qualities.

When the Venezuela controversy arose and a skilled geographer was needed, Mr Baker was called on, and the fine historical atlas he compiled and the volumes he saw through the press while in the service of the commission would alone form a worthy monument to any geographer.

Returning to the Survey, he busied himself largely in the preparation of a work on the synonymy and history of the geographic names of Alaska, entitled "A Geographic Dictionary of Alaska," which was issued as Geological Survey Bulletin No. 187 in 1902. The immense labor involved in this work and its usefulness to the cartographer and geographer make it of exceptional importance.

With his services to and interest in this Society you are all familiar, and no

one who has known him could be ignorant of his peculiarly lovable personality. I have touched in these remarks merely on the geographic side of his work and interests. While his recent transfer to the Assistant Secretaryship of the Carnegie Institution in a sense separated him from purely geographic matters, I cannot doubt that had his life been spared to round out the normal tale of days allotted by the Psalmist he would have continued to give us worthy contributions to the most inclusive of sciences until the very end. As it is, his contributions have been noteworthy, and will form, in the eyes of future students, an imperishable monument of our departed associate and friend.

CONTROLLING SAND DUNES IN THE UNITED STATES AND EUROPE*

By A. S. Hitchcock,

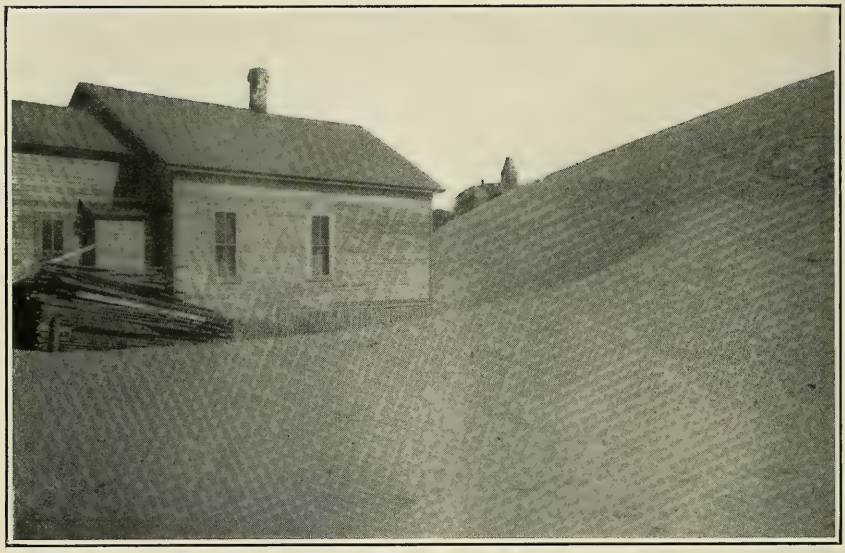
Assistant Agrostologist, U. S. Department of Agriculture

In many parts of the United States there are areas of drifting sand which are of much economic importance from the fact that they not only are useless for agricultural purposes, but may seriously encroach upon valuable property. These areas, known as sand dunes, consist of hills of sand which, when bare of vegetation, readily shift from place to place when acted upon by the wind, and are then called wandering or shifting dunes. Such dunes occur along sandy shores of the ocean, of the Great Lakes, or even along our large rivers, notably the Columbia River in Washington and Oregon. These dunes are formed from the sand which is washed up during the tides, storms, or high water in case of rivers. The sand soon dries, s blown in the direction of the prevailing winds, and forms drifts in the same manner as snow. The drifts may attain the size of hills, in some cases as much as 200 feet in height. Continuous winds blow the sand over the brow, and the whole dune thus moves slowly but irresistibly forward, covering whatever is in its track—fields, forests, ponds, rivers, buildings. The direction of the prevailing winds determines whether dunes will be formed along a sandy coast. On Lake Michi-

Sand Dune Overwhelming a Forest, Cape Henry, Virginia

The dune is moving slowly northward, burying the forest as it goes

*An address to the National Geographic Society, November 20, 1903.



Sand Dune Overwhelming a House at Manistee, Mich.

This dune, originally stationary some distance away and covered with grass, was converted into a shifting dune a few years ago by a party of townspeople celebrating a political victory upon its brow with bonfires, thus destroying the grass. A blowout was formed, and, no repairs being made, this gradually enlarged until the whole hill began to advance. The dune advanced eastward and soon threatened the city water-works and other property. This dune has now been controlled by beach grass and brush.

gan dunes are found at various places along the south and east shore, but none along the west shore. It is interesting to note that the dunes in this region are probably the largest and highest to be found on the continent, and are scarcely exceeded by any in Europe.

In nature, sand dunes are not formed where the conditions will allow a covering of vegetation; consequently they are not found in warm regions or only exceptionally, as the long vegetative season allows opportunity for a covering to become established; but in northern regions, where vegetation lies dormant for a considerable portion of the year, the severe winter storms may prevent such a covering from forming.

The chief areas of shifting dunes to be found along the Atlantic coast are on Cape Cod, in the vicinity of Provincetown; southern New Jersey, near Avalon and Stone Harbor; Cape Henlopen, near Lewes, Delaware; Cape Henry, Virginia, and less extensive, though quite troublesome, dunes at Currituck, North Carolina; Isle of Palms, near Charleston, South Carolina; and Tybee Island, near Savannah, Georgia.

Sand dunes occur at various places along the Pacific coast, as Ventura, Monterey, and Mendocino counties, California, and the coast of Oregon. The latter are minimized by the moist climate. Extensive and exceedingly troublesome dunes are found along the Columbia River in Oregon and Washington from The Dalles to Riparia. The sand is brought down during the floods and blown about during the long dry summers. Here the conditions as to rain-

Sand Dune Encroaching on Railroad, Near The Dalles, Oreg.

The sand is deposited during the highwater of the Columbia River and then blown eastward, in many places crossing the tracks of the O. R. and N. Ry. The fences are intended to carry the sand parallel to instead of upon the track. However, these fences do not entirely prevent the evil, and the sand must be removed from the tracks daily. Similar conditions exist in many places along the railroad from The Dalles to Riparia, Wash.

fall are reversed, the rain coming in the winter and the dunes forming during the dry summer.

More or less successful efforts have been made at various times to "fix" the dunes and thus prevent the serious injury which they cause to valuable property.

In order to attack these problems more intelligently, the writer was sent by the Department of Agriculture to investigate the methods used in Europe, where work of this character has engaged the attention of the various governments for 50 years or more, and where the efforts in fixation or reclamation have been more successful than anywhere else in the world.

For this purpose typical dune areas in Holland, Denmark, Prussia, and France were visited. In all cases the reclamation is carried on by the general government, sometimes assisted by the local government, as private individuals are unable to bring to bear upon the problem sufficient means or continuity of purpose.

The fundamental principle of dune fixation is to cover the sand with a layer of any material which will prevent the access of the wind to the surface and thus prevent drifting. The kind of cov-

Sand Dunes Controlled by a Covering of Sand Hedges, on the Kurische Nehrung, Northeastern Prussia

ering used depends upon climatic conditions and the availability and cost of material. The aim is, when possible, to produce a forest, as this is permanent, and, moreover, if properly managed, yields an income. However, a forest can not be produced with certainty upon a surface of drifting sand, and it is therefore necessary to temporarily fix the sand in some other manner. Although any covering of inert material, such as chips, gravel, brush, etc., would answer the purpose, economic factors have reduced the preliminary methods of fixation to these: (1) transplanting beach grass; (2) covering with heather; (3) covering with a network of sand hedges.

(1) Many plants have been tried, but the most satisfactory is beach grass (*Ammophila arenaria* Link). This grass grows naturally upon the sand dunes of the north Atlantic coast of Europe as far south as Morocco, and of America as far south as North Carolina, and also along our Great Lakes. This is the grass which was used in reclaiming the land which is now Golden Gate Park in San Francisco. It has also been imported at various other points along the Pacific coast. To fix the sand the grass is transplanted in spring or fall and set two or three feet apart in the sand. The blowing sand is caught and held by the grass, but it has the power to grow up through the accumulated sand, and thus, with care to replant where necessary, it becomes a permanent covering. As a forest can not be established close to the ocean, a strip a few rods wide must be permanently fixed in this manner.

(2) In localities where heather is abundant this is cut with brush scythes and laid upon the surface of the sand. It is held in place by a little sand thrown over the edge of each layer.

(3) Where neither beach grass nor heather is available, or where the conditions are especially severe, sand hedges are used. These consist of rows of cut brush or stakes or of cut reeds, which are inserted in the sand in rows or quadrangles, allowing the upper end to project for six inches or more.

After the sand is temporarily fixed by one of these methods young trees, usually conifers, are transplanted, and the forest soon removes all danger of further shifting. In southwestern France the forest was established by sowing the seed of *Pinus maritima* upon the sand and covering with brush, but this method has not been successful in northern Europe. In France, and also the Kurische Nehrung, in Prussia, it has been found necessary to form artificially a long barrier dune between the ocean and the forest which protects the latter. This barrier dune is fixed by means of beach grass, but requires constant oversight to keep it in order. During severe storms dangerous breaches are formed, which, if neglected, would soon destroy the dune and seriously injure the forest in its lee. These breaks are mended by sand fences such as already described, but taller, which rapidly accumulate the sand until the hole is filled.

The trees used in northern Europe are chiefly *Pinus montana*, *P. laricio*, *P. austriaca*, and *P. sylvestris*.

TIMBERLINES

By Israel C. Russell, of the University of Michigan

IN the February number, 1903, of the National Geographic Magazine I proposed the terms *cold timberline*, *dry timberline*, and *wet timberline* by which to designate respectively the three principal boundaries of forests. To this nomenclature Dr C. Hart Merriam records a protest in the March number of the same publication.

The principal objection advanced by Dr Merriam is the time-honored use of the word timberline as a name for the upper limit of tree growth on mountains. To employ the word in any other connection, as he states, deprives it of "its fixed and definite value." He also directs attention to the fact that the lower limit of tree growth in arid regions, or what I have termed the dry timberline, is in certain instances determined by temperature and not by lack of humidity.

During the past summer I made an extended journey in Oregon, where both the upper and lower limits of the forests are well defined, and was enabled to test the nomenclature referred to in a typical region. On account of this added experience, but fully appreciating the value of the criticisms advanced by a leader in a science closely related to physiography, I take this opportunity to explain, perhaps more fully than in my previous communication, my reasons for claiming recognition for more than one timberline.

There can be no controversy as to the fact that forests on high mountains frequently terminate abruptly at their upper limit, or that in certain portions of arid regions they have an equally well defined lower limit. The question is: Shall we ignore the lower boundary or give it a place in geographic nomenclature, and if admitted to be of sufficient importance to require a name, how shall it be designated?

Although the conditions which draw

a lower limit to the distribution of trees do not make their influence conspicuous over such a wide extent of territory as those which determine the similar upper boundary, yet when they are in control the line established is strongly pronounced and frequently passes through an inhabited region and is of decided economic importance. This last consideration does not apply to the line defining the upper limit of forests. Then, too, the lower limit of the forests in arid regions is also the border of treeless valleys, prairies, and deserts, and hence the most important of all the natural boundaries as expressed in the flora and fauna of arid and semi-humid countries. These statements do not seem to be open to objection, and, as may reasonably be claimed, indicate the importance of the boundary referred to and the desirability of a brief and convenient method of designating it. The boundary in question is of the same general nature as the line defining the upper limit of tree growth—that is, it is a line across which trees do not pass, and must either be designated in a corresponding manner or be given an entirely new name. Of these two alternatives the first certainly seems the more logical. By using timberline as a generic term, as many species of the "genus" can be recognized as the conditions warrant. By doing this we are not detracting from the "fixed and definite value" of the generic word, but adding to the precision with which it may be employed and enlarging its usefulness.

In criticism of the term "dry timberline," Dr Merriam states "that the lower limit of tree growth in many parts of the West is determined by temperature rather than aridity, though in some cases aridity is the controlling factor." If temperature—*i. e.*, too great a degree of heat—is sufficiently important in this connection to be frequently mentioned or discussed, it would indicate the desirability of recognizing a "hot timberline," but I do not understand that such is the case. In proposing the term "dry timberline," I sought to express in the name the prevailing and most important reason for the sharp demarcation of forests at their lower limit in arid regions. Other factors, as is well known, enter into the problem and locally assume control; such as soil texture, hot winds, fires, etc., but the prevailing and dominant condition governing the advance of forests into arid regions, to which all others must be considered as secondary, is dearth of soil moisture due to aridity of climate. In this connection it is instructive to note that *timberline*, in the narrow sense to which Dr Merriam would restrict the use of the word, is, to use his own definition, "the upper or boreal limit of tree growth as determined by temperature." Is this more exact than referring the lower limit of tree growth to aridity? There are other factors besides temperature, as observation has shown, which are effective in determining the upper limit of forests, such as the severity of winter storms (a very important and frequently controlling factor), slope of surface, degree of exposure to the sun, depth of snow, etc., each of which in certain instances locally determines the position of the boundary referred to. The most common and the dominant cause, however, to which the others are secondary or local, is a low mean annual temperature. Taking the dominant cause in each instance for the specific designation, we have the terms *dry timberline* and *cold timberline*. In a similar manner the use of the term *wet timberline* might be justified.

This discussion, however, is not really to the point, since the main objection advanced is reverence for precedent. The word timberline has been employed for a long time to designate the upper limit of tree growth on high mountains and no other similar line recognized. This custom may be said to be fixed in

popular usage, and no amount of argument will lead to a sudden change. In the writings of physiographers, foresters, naturalists, etc., however, it is but reasonable to urge that a lower as well as an upper timberline should receive attention and a consistent and logical nomenclature adopted for all similar boundaries of forests.

DECISIONS OF THE UNITED STATES BOARD ON GEOGRAPHIC NAMES

During the Period June 1 to November 20, 1903

Aberjona; river, Middlesex County, Massachusetts (not Abbajona).

Aeneas; creek, lake, mountain, and valley, Okanogan County, Washington (not Eneas).

Ahoskie; creek, post-office, railroad station, ridge, and village, Hertford County, North Carolina (not Ahoskey nor Ahosky).

Antoine; creek and valley, Okanogan County, Washington (not Antwine).

Attalla; precinct and town, Etowah County, Alabama (not Atala nor Attala).

NOTE.—This is a reversal of the decision *Atala* made in April, 1895.

Bellmont; post-office, precinct, railroad station, and village, Wabash County, Illinois (not Belmont).

Bighorn; river, in Montana and Wyoming, tributary to the Yellowstone (not Big Horn).

Blacks; fork of Green River in Sweetwater and Uinta Counties, Wyoming, and Summit County, Utah (not Black).

Blueberry; hill, in Woburn, Middlesex County, Massachusetts (not Mt Pleasant).

Bonpas; creek, Edwards, Richland, and Wabash Counties, and township, Richland County, Illinois (not Bompas nor Bonpass).

Cabezon; Indian reservation, Riverside County, California (not Cabazon, Cabazone, nor Cabezons).

Carpinteria; creek, landing, post-office, and railroad station, Santa Barbara County, California (not Carpenteria).

Carrabassett; stream, tributary to the Kennebec River, Franklin and Somerset Counties, Maine (not Carabasset, Carrabasset, nor Sevenmile).

Castile; run, tributary to south fork of Tenmile Creek, Greene County, Pennsylvania (not Casteel).

Chads Ford; post-office, railroad station, and village, Delaware County, Pennsylvania (not Chadd Ford, Chadds Ford, Chad's Ford, etc.).

Chopaka; mountain, Okanogan County, Washington (not Chapace, Chapaka, Chopace, Tcho-pahk, Tcho-park, etc.).

Chupaderas; creek, Bexar County, Texas (not Chupaderos nor Chupederas).

Croxton; run, Knox township, Jefferson County, Ohio (not Coxsons, Coxton's, Crockson, Crookston, etc.).

Cush Cushion; creek, in Greene township, Indiana County, Pennsylvania (not Cushcushion, Cush-Cushian, nor Cushian).

Eldon; lake (arm of Raquette Lake) Hamilton County, New York (not Elizabeth nor Ellen).

Gallups; island, Boston Harbor, Massachusetts (not Gallop, Gallops, Gallup, nor Galop).

Georges; island, Boston Bay, Suffolk County, Massachusetts (not George nor St George).

Goleta; point, three miles southwest of Goleta, Santa Barbara County, California (not Pelican).

Harding; ledge, at entrance to Boston Bay, Massachusetts (not Harding's).

Hardys; pond, in Waltham, Middlesex County, Massachusetts (not Hardy, Mead, nor Means).

Hawlings; river, tributary to the Patuxent, Montgomery County, Maryland (not Hawling's nor Hollands).

Hayden; lake, in Madison town, Somerset County, Maine (not Madison [pond]).

High; hill—highest hill on Long Island—in Huntington, Suffolk County, New York (not Jayne's nor West).

Hollenbeck; river, Litchfield County, Connecticut (not Hallenback, Hallenbech, nor Hallenbeck).

Jamacho; land grant and post-office, San Diego County, California (not Jamacha).

Little Bighorn; river, in Montana and Wyoming, tributary to the Bighorn (not Little Big Horn nor Little Horn).

Little Sodus; bay, Lake Ontario, Cayuga County, New York (not Fairhaven).

Marlboro; township, Delaware County, Ohio (not Marlborough).

Myers; creek, Okanogan County, Washington, and British Columbia (not Meyers nor Myer).

Myers Creek; mining district and precinct, Okanogan County, Washington (not Meyers Creek).

New Kingstown; post-office, railroad station, and village, Cumberland County, Pennsylvania (not New Kingston).

Nissequogue; neck and river, Smithtown, Suffolk County, New York (not Nessequoque, Nissaquague, Nissaquog, etc.).

Nixes Mate; shoal, in Boston Bay, Suffolk County, Massachusetts (not Nicks Mate, Nix Mate, Nix's Mate, nor Nixs Mate).

Orowoc; cove and creek, Islip, Suffolk County, New York (not Oriwic, Oriwoc, nor Tern's).

Pakatakan; mountain, Delaware County, New York (not Pakataghkan).

Peddocks; island, in Boston Bay, Plymouth County, Massachusetts (not Peddock, Pethick's, Pettick's, nor Puttock).

Pines; river, forming boundary between Essex and Suffolk Counties, Massachusetts (not Bear nor Chelsea).

Salitrillo; creek, Bexar County, Texas (not Salatrillo).

San Dieguito; river formed by the junction of Santa Maria and Santa Ysabel Creeks, San Diego County, California (not Bernardo, San Bernardo, nor San Pasqual).

Santa Ysabel; creek or river, uniting with the Santa Maria to form the San Dieguito, San Diego County, California (not San Pasqual nor San Ysabell).

Segloch; run, Lancaster and Lebanon Counties, Pennsylvania (not Seclock, Seelock, Zeloch, etc.).

Sequan; Indian reservation and mountain peak, San Diego County, California (not Cycuan, Sycuan, nor Syenan).

Tasnuna; river, tributary to Copper River from the west, opposite Bremner River Alaska (not Tasnu).

Tinkers; island, southeast of Marblehead Neck, Essex County, Massachusetts (not Tinker nor Tinker's).

Toats Coulee; precinct, Okanogan County, Washington, and stream, tributary to the Similkameen near longitude 119° 45′ (not Toad Coulee, Toads Coula, Toats Coula, etc.).

Toro; Indian reservation, Riverside County, California (not Toros, Torres, nor Torros).

Tonasket; creek and post-office, Okanogan County, Washington (not Tenasket, Tonaskot, nor Dry Gulch)

Toroda; creek, in Ferry and Okanogan Counties, and mountain, Okanogan County, Washington (not Tarota, Tarroda, nor Teroda).

NOTE.—This is a reversal of the decision *Teroda*, made March 12, 1902, for the creek and mountain.

Toroda Creek; precinct, Okanogan County, Washington (not Teroda Creek, etc.).

Tunk; creek and mountain, Okanogan County, Washington (not Tonk).

Weir; river (channel), Boston Bay, Plymouth County, Massachusetts (not Weare).

Wills; creek, Jefferson County, Ohio (not Will, Willis, nor Will's).

Yahara; river, in Dane and Rock Counties, Wisconsin (not Catfish nor Gahara).

STATISTICAL ATLAS OF THE UNITED STATES

THE Census Office has just issued the Statistical Atlas of the United States for the last census. It is a magnificent volume, 10 by 12 inches, containing 207 plates and hundreds of maps and diagrams, which show the complete results of the census in graphic and convenient form. The majority of the maps, charts, and diagrams are in colors, often as many as five and six colors being used on one map.

The atlas is divided into four parts: Population; Vital Statistics; Agriculture; Manufactures. The series of charts on each of these subjects is preceded by a chapter of explanation. The work was prepared under the supervision of Mr Henry Gannett, Geographer of the Twelfth Census.

The atlas is a unique publication. No other government in the world issues any similar work comparable to it. The Census Office deserves great credit for the promptness with which the atlas has been prepared and published. It may be obtained of the "Superintendent of Public Documents, Washington, D. C.," for $4.00.

The famous Waldseemuller map of 1507, the earliest one in existence bearing the name of America, was exhibited for the first time in America December 18 in an address to the National Geographic Society by Prof. E. L. Stevenson, of Rutgers College. This map was recently discovered in Germany * by Joseph Fischer and antedates by a number of years any other map containing the word America. Fischer found it in the archives of one of the ducal castles of Prussia. The map is nine feet long. It is believed that Waldseemüller printed 1,000 copies of this map in 1507, but as it was a wall map, all of the copies have perished except this one.

*See NATIONAL GEOGRAPHIC MAGAZINE, February, 1902, page 72.

Diagram Showing the Average Number of Persons to a Private Family in each State and Territory of the United States in 1900: Gannett's Statistical Atlas of the United States

It is interesting to note that nearly all the southern states lead in the size of their private families, while the six New England states, and New York, California, and Washington bring up the rear.

The later Waldseemüller map of 1516, on which the name America does not appear, as the author had learned by that time that he had unjustly given Amerigo Vespucius credit for discovering the new world, was exhibited for the first time in America by Professor Stevenson at the same time.

Diagram Showing the Average Number of Persons to a Family in the United States—1850 to 1900.

The census figures show that the number of persons in the average American family is nearly one less than it was 50 years ago—4.7 in 1900 as against 5.6 in 1850.

GEOGRAPHIC LITERATURE

Around the Caribbean and Across Panama. By Francis C. Nicholas, Ph. D. Illustrated. Pp. 373. 6 by 8 inches. Boston: H. M. Caldwell Co. 1903. $2.00.

This timely book describes in interesting manner the incidents and adventures of the author in the various countries bordering the Caribbean sea. As the commercial explorer of large moneyed interests, Mr Nicholas has transversed Colombia, Venezuela, Panama, Central America, and the many islands of the West Indies. He dwells repeatedly on the great untouched wealth and possibilities of these countries, which, he asserts, far surpass even common report. At present, however, American capital investing in these regions takes great risks of losing everything, owing to political uncertainties.

Mr Nicholas' experiences on his journeys to Bogota were extremely disagreeable.

"On the road across the mountains there were no exciting incidents, only annoyances; the way was tedious, the people inhospitable, the road-houses unclean, and their charges little short of robbery.

"Bogota is on the eastern side of a great interior savannah, an open grass plain at almost ten thousand feet elevation above the sea, a place of enchanting beauty, a broad expanse of open country surrounded by the bleak summits of inner ranges of the Andes Mountains.

"But the city is a place of vermin and corrupting filth; a place where the common incidents of the streets are not fit to be described; where beggars, displaying revolting sores and rotting limbs, swarm about, even thrusting their filthy bodies where they may touch those who pass by, while they demand, not solicit, alms; where ill-mannered, arrogant, overdressed people make vulgar display of their clothes as they strut about and crowd for precedence, making much of the antiquated custom of demanding a

place next the wall—a fad which caused continued misunderstanding, because all claimed the wall and it was difficult to pass. For my part, I walked mostly in the streets and left the sidewalks to the natives.

"In Bogota one can see the Sedan chairs in active use, similar to those which are read about in historic accounts of periods some two or three centuries gone past. Here ladies, to show their piety and religious sentiment, go about dressed as penitents in rough garment and belt of rope, but the dress is drawn tightly about them, that they may not touch the swarms of filthy people."

The volume is handsomely illustrated from photographs and with maps, and is an exceedingly desirable book.

Elementary Geography. By Charles F. King, Master of the Dearborn School, Boston. Profusely illustrated. Pp. vi + 220. 9 by 10½ inches. Boston: Lothrop Publishing Co. 1903. $0.65.

In plan and in treatment, and especially in illustrations, this elementary geography is a great advance over previous textbooks. It will create a new era in the teaching of geography to young children. The numerous graphic illustrations must appeal to the quick fancies of young people, while the simple, unpretentious language will hold their attention. The author has constantly remembered the words of Herbert Spencer that "a child's restless observation, instead of being ignored or checked, should be diligently administered to and made as accurate and complete as possible;" and he has also kept in mind the fact that the power of observation comes to children first and the power of reasoning later. As a result, his book will stimulate the questioning faculty which all young people have in such marked degree, instead of confusing and checking their ideas with elaborate explanations which they are unable to grasp.

A Mother Kangaroo, with a Young Kangaroo in her Pocket

From King's "Elementary Geography." Copyright, 1903, by Lothrop Publishing Co.

The book is divided into four parts: Home Geography by Observation, Geography through Type Forms, The Earth as a Whole, and Journey Journey. All descriptions and explanations are given

From Brownell's "The Heart of Japan." Copyright, 1903, by McClure, Phillips & Co.

as a story to the children. Photographs are exclusively used as a basis for the pictures of wild animals. Useful suggestions are given at the end of each chapter. The author is to be especially congratulated on his choice of illustrations. Each picture has some striking fact so vividly presented that the lesson is not forgotten. Some very handsome colored plates are given in the book. The publishers have done their part as well as the author. The work is handsomely printed, the type large, and the pictures clear and elegantly engraved.

The Heart of Japan. By H. L. Brownell. Illustrated. Pp. 309. 5 by 7½ inches. New York: McClure, Phillips & Co. 1903. $1.50 *net.*

Mr Brownell was for many years a teacher of English in the public schools of Japan. Most of the time he was stationed in towns away from the railways, where he lived with country people—the true Japanese, as he calls them. Many books have been written about the Japanese during the last few years, but the present one is distinct and fresh and gives a charming and entirely different account of the lives of this bright and fascinating people. The reader sometimes wonders whether Mr Brownell is not emulating Munchausen, but all his stories are so well told that we must believe him.

The opening chapter describes an enterprising farmer who dug a deep well on his fields, and then put in an American pump, consecrated it to a god, and then allowed all worshipers at this shrine free baths. The water which the many devotees zealously pumped meanwhile by a hidden conduit was led out to irrigate his fields, and kept them green and prosperous when all other fields were parched and ruined.

Chapter V, "The Honorable Bath," describes another phase of Japanese country life. Every chapter in the book is almost equally well done, though, perhaps, the most interesting is "Diving Belles." This is an account of a peculiar seacoast village, where the women so outclass the men in diving for pearls that the men stay at home and keep house and do the cooking, etc., while their wives are swimming and diving for hours in the sea.

BOOKS RECEIVED FOR REVIEW

The Moon. By Wm. H. Pickering. With 100 full-page plates. Pp. xii + 108. 11 by 12 inches. New York: Doubleday, Page & Co. 1903. $10.00 *net.*

New Conceptions in Science. By Carl Snyder. Illustrated. Pp. 361. 5½ by 8 inches. New York: Harper & Brothers. 1903. $2.00 *net.*

Climbs and Explorations in the Canadian Rockies. By H. E. N. Stutfield and J. Norman Collie, F. R. S. Illustrated. Pp. 343. 6 by 9 inches. London: Longmans, Green & Co. 1903. $4.00 *net.*

A Handbook of Modern Japan. By Ernest W. Clement. Illustrated. Pp. 395. 5 by 7½ inches. Chicago: A. C. McClurg & Co. 1903. $1.50.

The Forest. By Stewart Edward White. Illustrated. Pp. 276. 6 by 9 inches. New York: The Outlook Company. 1903. $1.50 *net.*

Handbook of Commercial Geography. By Geo. G. Chisholm. (Fourth corrected edition.) Illustrated. Pp. xlvi + 639. 6 by 9 inches. New York and London: Longmans, Green & Co. 1903. $4.00.

Present Day Egypt. By Frederic Courtland Penfield. Illustrated. Pp. 396. 5½ by 8 inches. New York: The Century Co. 1903. $2.00.

The Russian Advance. By Albert J. Beveridge. Illustrated with maps. 6 by 8½ inches. New York: Harper Brothers. 1903. $2.50 *net.*

Indians of the Painted Desert Region. By George Wharton James. Illustrated. Pp. 268. 6 by 8½ inches. Boston: Little, Brown & Co. 1903. $2.00 *net.*

Indians of the Southwest. By George A. Dorsey, Ph. D. Illustrated. Pp. 222. 5½ by 7½ inches. Chicago: Passenger Department, Atchison, Topeka and Santa Fé Railway. 1903. $0.50.

Round Kangchenjunga. A narrative of mountain travel and exploration. By Douglas W. Freshfield. With illustrations and maps. Pp. xvi + 373. 6½ by 10 inches. London: Edward Arnold. New York: Longmans, Green & Co. 1903. $6.00 *net.*

Irrigation in India. (Second edition.) By H. M. Wilson. Illustrated. Pp. 238. 6 by 9 inches. Washington: Geological Survey. 1903.

NATIONAL GEOGRAPHIC SOCIETY

In view of the present widespread interest in the Republic of Panama and of the paramount importance to this country of the Panama Canal, the Lecture Committee have altered the program previously announced and have made arrangements for two addresses on the Panama question.

The first of these will be by Hon. Wm. H. Burr, member of the Isthmian Canal Commission and Professor of Engineering in Columbia University, and will be given on Friday evening, January 15.

The second address will be given on Saturday evening, January 30. The name of the speaker will be announced later.

The committee have also changed the subject of the afternoon course of lectures during February and March from that previously announced, "The Growth of Diplomacy," and announce instead a course of five addresses on "The Countries of South America."

The completed program for the remainder of the season is as follows:

REGULAR MEETINGS OF THE SOCIETY

The annual meeting will be held in the large hall of Columbian University, and succeeding meetings at the Cosmos Club until Hubbard Memorial Hall is completed (about February 1).

January 8, 1904.—Annual meeting, followed by an address by Prof. Wm. M. Davis, of Harvard University, on "A Summer in Turkestan."

January 22.—"The Work of the Bureau of Insular Affairs." Col. Clarence R. Edwards.

February 5.—"The Work of the Bureau of Statistics." Hon. O. P. Austin.

February 12.—"The Work of the Bureau of Fisheries." Dr Barton W. Evermann.

March 4.—"The Work of the National Bureau of Standards." Dr G. M. Stratton.

March 18.—"The Work of the U. S. Biological Survey." Dr C. Hart Merriam.

POPULAR COURSE

National Rifles' Armory, 920 G street, at 8 p. m.

Friday, January 15.—"The Republic of Panama." Hon. Wm. H. Burr, of the Isthmian Canal Commission.

Saturday, January 30.—"Panama and the Panama Canal."

Saturday, February 20.—"Joys of the Trail." Mr Hamlin Garland, author and lecturer.

Friday, February 26.—"Travels in Arabia and Along the Persian Gulf." Mr David G. Fairchild, Agricultural Explorer of the Department of Agriculture.

Friday, March 11.—"Little Known Peoples of Mexico." Dr Carl Lumholtz, author of "Unknown Mexico," etc.

Friday, March 25—"The Louisiana Purchase Exposition." President David R. Francis.

Friday, April 11.—"The Ancient People of Bolivia." Mr Adolph F. Bandelier, American Museum of Natural History.

AFTERNOON COURSE OF LECTURES

In the large hall of Columbian University.

General subject: The Countries of South America.

February 27.—Colombia and Venezuela. Hon. F. B. Loomis, Assistant Secretary of State.

March 5.—Peru. His Excellency Manuel Alvarez Calderon, E. E. and M. P. from Peru.

March 12.—Brazil. Hon. Robert Adams, Jr., M. C., formerly Minister to Brazil.

March 19.—Argentine Republic.

March 26.—Chile. Mr Charles M. Pepper.

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VOL. XV, NO. 2 WASHINGTON FEBRUARY, 1904

THE NATIONAL GEOGRAPHIC MAGAZINE

THE REPUBLIC OF PANAMA

BY HON. WM. H. BURR, OF THE ISTHMIAN CANAL COMMISSION

THE youngest of the American republics has almost the oldest history. The Caribbean coast line of Colombia and of Panama was one of the earliest localities visited by the old Spanish navigators. One of them, Alonzo de Ojeda, visited a number of places along this coast in 1499 and 1501, while Columbus visited Porto Bello, 25 miles northeast of Colon, and other places in 1502, during his last voyage. From those dates onward all this portion of the Spanish main was constantly visited, explored, and apportioned among Spanish officials. Many expeditions of discovery were made inland, until all that northwesterly portion of South America which has so long been known as Venezuela, Colombia, and Ecuador was completely explored and a fair knowledge of its resources, mineral and otherwise, obtained.

One of the most important incidents in these exploring expeditions occurred when Vasco Nunez de Balboa, governor of the province in Darien, first set out southward from his capital, Santa Maria de la Antigua, prompted by what the Indians had told him, and, from an elevation on the divide north of the Gulf of San Miguel, discovered the Pacific Ocean on the 25th day of September, 1513. Many of the earliest historical events of the Republic of Panama are associated with this intrepid explorer. He was on the Isthmus but a short period, but his restless energy was ever prompting him to new enterprises of exploration and aggrandizement of territory for his home government. His remarkable career was cut short in 1517 by his execution at Acla, on the Caribbean shore of the Gulf of Darien, by a jealous governor of the province, who feared that Balboa's fruitful enterprises might give him sufficient *éclat* to make him the head of the new Spanish territory in place of himself.

The Spanish discoverers found all this country, like others of South and Central America, peopled with large numbers of Indians.

The territory constituting the present Republic of Panama, as well as the northwesterly portion and west coast of South America, was carefully scoured in search of the precious metals of which fabulous stories were related by the natives, many of which were justified by subsequent results. Balboa himself visited

the Pearl Islands in the Bay of Panama. These operations of the early Spaniards involved frequent crossing of the Isthmus, and even before the death of Balboa it became evident that the most practicable line of transportation was that which is now known as the Panama route.

Many attempts were made to find other practicable routes across the Isthmus between the Atrato River, emptying into the Gulf of Darien, and the Chagres River, emptying into the Caribbean Sea eight miles west of Colon; but the advantages of the Panama route were promptly recognized by the Spaniards.

A territory, consisting largely of the present Panama, Colombia, and Venezuela, was formed into the province of Tierra-firma. It was the governor of this province, Pedro Arias de Avila, who, to strengthen his authority, brought charges against Balboa, and after a form of trial executed him at Acla. By the middle of the sixteenth century large numbers of Spaniards had migrated to this country and created flourishing centers of trade. About this time, in order to secure a more suitable government for his colony, the Spanish emperor created the presidency of New Granada, which was subsequently raised to the rank of a viceroyalty in 1718, then including not only Colombia and Venezuela but Ecuador also. The territory of the Isthmus formed the northwestern arm of this Spanish appanage.

Like that of most Spanish colonies, the government of the country was corrupt, being administered largely for the benefit of the favored few in authority; but on the whole the country flourished, the population increased, and trade extended along the lines of production of the country.

THE REVOLUTION AGAINST SPANISH AUTHORITY

The course of affairs in the viceroyalty continued without much change until 1811. Many features of the Spanish rule had long borne heavily upon the people and aroused such feeling that at last they broke out into an insurrection against the home government. A continuous war against the Spanish forces sent to put down the insurrection continued until 1824, when Spanish authority disappeared. Meantime the Venezuelan patriot, Simon Bolivar, born in the city of Caracas in 1783, made his way into prominence in national affairs, and in 1819 completed a union of the three divisions of the country into the first Republic of Colombia. This republic was short lived. Venezuela withdrew in 1829 and Ecuador in 1830. The creation of the Republic of New Granada followed in 1831, but its constitution was not formed until 1832. Under it the territory was divided into eighteen provinces. The president of the new republic held office four years. The course of affairs was much disturbed, and a civil war broke out after one or two presidential terms, and did not close until 1841. In 1840 the Province of Cartagena seceded from the new republic, and immediately thereafter the neighboring provinces of Panama and Veragua took the same step. This was the first period of independence of the Isthmus of Panama. The revolting states were soon reunited under a constitution reformed in 1843. The Republic of New Granada enjoyed little tranquillity, being subject to domestic disturbances of greater or less magnitude almost continuously, but various measures signifying general advancement in civilization were adopted from time to time. Among those was one by which slavery was entirely abolished in 1852.

An important alteration of the constitution took place in 1853, under which the provinces were merely federated into the republic, each being granted the right to assume its independence at any time. This right under

A Wedding at Colon

the constitution was asserted by Antioquia and Panama in 1856 and 1857, this being the second independence of the Province of Panama. Stormy times followed these national upheavals, and the independence of the provinces was not long undisturbed. A congress at Bogota established a republic under the name of the United States of Colombia in 1861, adopting a new federal constitution for the purpose of including all the territory hitherto held by the Republic of Colombia, including the Isthmus of Panama. The opposite party, however, victorious in the western portion of the country, declined to acknowledge the authority at Bogota. Internal disturbances of all degrees,

including the assassination of leaders and bloody battles, constituted the program until 1862, when the opposing parties came to terms to a sufficient extent to permit the appointment of a provincial government and the drawing up of a constitution. At this time another attempt, not successful, was made to reëstablish the former republic of the three countries—Venezuela, Colombia, and Ecuador; but under the constitution adopted May 8, 1863, the Republic of Colombia was erected, and it has endured to the present time. Insurrections and internal disorganizations prevailed for a number of years, and the history of the Republic has been accentuated by frequent revolutions, many of which have taken place in Panama.

EXTENT OF THE PRESENT REPUBLIC

This brings us to the consideration of the Republic of Panama as it now stands, having declared its independence on November 3, 1903. The Republic of Panama is identical in territorial limits with the department of Panama of the Republic of Colombia. This department extended from Costa Rica on the west to a line drawn first nearly due south from Cape Tiburon at the southern limit of the Gulf of Darien, then southwesterly to a point on the Pacific coast a short distance southeast of Punta Cocalito. This last or eastern limit of the department of Panama is almost entirely along the divide between the Atrato River and the watershed draining into the Gulf of San Miguel.

The Republic of Panama lies between the parallels of 7° 15′ and 9° north latitude, and also between 77° 15′ and 82° 30′ longitude west from Greenwich. Approximately speaking, therefore, its extreme length east and west is about three hundred and fifty miles, and its extreme width north and south one hundred and twenty miles. Its population is not well determined, but it probably does not extend three hundred thousand. This population is largely composed of people of Spanish descent, but there are also large numbers of negroes, who have come chiefly from Jamaica during the constructing work conducted by the old Panama Company. A few Chinamen have also found their way to the Isthmus and become permanent residents. The native Indians are also occasionally seen on the zone of population between Panama and Colon. These races have been mingled in all conceivable proportions, so that the features or racial characteristics of one or more or even all of these various nationalities may be traced in the face of a single individual. Some of the old Spanish families have still retained the purity of their blood and are among the prominent people of the Isthmus. Its entire area is about 31,600 square miles, or about the area of the State of Indiana.

The Cordillera forming the main mountain ridge extending from South to North America and constituting the continental divide runs through the entire length of the Republic of Panama, in the eastern portion the divide being much nearer the Caribbean Sea than the Pacific Ocean, while in the western portion its location is more nearly central. The low notch or saddle in the Cordillera near the city of Panama, with a summit elevation about 300 feet above sea level, the lowest throughout the Central American Isthmus except at Nicaragua, affords the railroad location built upon nearly fifty years ago and the recommended route for the isthmian ship canal.

Not less than one-half of the entire territory of the Republic is mountainous and covered with luxuriant tropical vegetation, including heavy forest trees, some of which are among the highly valuable woods. These forests are practically trackless. Tribes of Indians, not in large numbers, live along the Caribbean coast between Panama and Darien,

and also on the southern slopes. Some of these Indians preserve jealously their isolation, and have never acknowledged the sovereignty of any government.

THE PANAMA RAILROAD

The most prominent feature of the Republic of Panama is the Panama Railroad and the partially constructed canal, with the adjacent strip of territory, including the cities and towns, with their aggregated business or industrial centers, along the line from Colon to Panama.

This railroad, a single-track line of five feet gauge, was built nearly fifty years ago. It is but forty-nine miles long, and it is conducted practically as an American railroad corporation, although it is owned by the new Panama Canal Company. The principal offices of the company are in the city of New York. This company does not confine itself wholly to railroad business, but owns and conducts the line of steamers running between the ports of New York and Colon under the name of the Panama Railroad-Steamship Company.

The railroad forms a line of land transportation to which converges marine commerce from many widely separated ports of the world. On the Pacific side steamship lines plying up and down the west coast of South America, and the Pacific mail steamships touching along the North and Central America coast from San Francisco southward, together with other ships approaching from the Pacific Ocean, have made Panama their terminal port for many years. The port of Colon has an equally extensive ocean shipping business, with not less than nine or ten steamship lines from Spain, France, England, Germany, Italy, and the United States, making it either a terminal port or port of call. In addition to these ocean steamship lines there is a little coasting trade of a local character on both sides of the Isthmus carried on in small sailing vessels.

The Panama Railroad has always been a prominent transportation line, along which currents of commerce and streams of passenger traffic, fed by the steamship lines on the two oceans, have continuously flowed. Latterly a considerable banana trade has also sprung up along the railroad line.

THE RELATION OF THE ISTHMUS TO THE REST OF THE WORLD

The location of the Isthmus is markedly central to that portion of the through commerce of the world which would be served by the Panama Canal. It is practically a half-way station between the ports of eastern Asia, Australia, and the islands between and the ports of Europe. It is believed that the opening of the canal will create a highly stimulating influence upon the trade between the west coast of South America and the ports of the United States—a business which has hitherto been developed chiefly with foreign ports. The geographical relation of the Republic of Panama to some of the principal ports of the world is shown by the following statement of the distances in nautical miles to be sailed by steam vessels on the respective trips indicated:

	Miles
From Panama to San Francisco	3,277
From Panama to Honolulu	4,665
From Panama to Yokohama	8,065
From Panama to Shanghai	8,985
From Colon to New York	1,981
From Colon to Liverpool	4,720
From Colon to New Orleans	1,380

THE RESOURCES OF THE REPUBLIC

The mineral resources of the Republic of Panama are practically undeveloped, although it is known that there are considerable deposits of coal of fair quality—perhaps of excellent quality—not far from the railroad and canal zone. The precious metals are found in small quantities at many points, with indications of greater value; but these resources, like many others of the new republic,

Grinding Grain

are in such an undeveloped stage that no definite statement can be made as to their potential value.

The agricultural resources of the country are greater than ordinarily supposed. There is excellent grazing land near Colon, along the Panama Railroad, and within a few miles of the city of Panama. Further west, in the Chiriqui district, and on the Pacific side of that portion of the Isthmus, there are extensive stretches of country well adapted to agricultural purposes, both for grazing and for the raising of all those tropical products which grow in such luxuriance throughout the fertile portions of Central America and the Isthmus. Fine grades of stock in substantial numbers are already found on some portions of the Isthmus, and dairy farming is already conducted in the vicinity of Panama.

Large stretches of native forests of valuable timber, such as mahogany, both light and dark, and other similar woods are found throughout the Republic, but are yet practically undeveloped. Such valuable tropical products as cacao, bananas of all kinds, sugar cane, indigo, cotton, tobacco, vanilla, corn, rice, and other similar products grow in abundance, and conditions of systematic industry only are needed to develop them into sources of great wealth to the country. Under the encouraging influences of a stable government, where life and property are respected, the natural resources of the Republic of Panama will be productive of an amount of wealth which, if stated in a quantitative way, would now be incredible, in view of the crude and depressed conditions of industry which have prevailed from the beginnings of its history to the present time.

COMMUNICATION

There are practically no roads found in the Republic except those of a crude and ill-kept kind near to the cities or towns along the line of the Panama Railroad Company between Colon and Panama. The only marked exception to this statement is the old so-called Royal road built between Cruces, on the upper Chagres, to Panama, a distance of about 17 miles. This old road, formerly a crude paved way, was traveled by passengers crossing the Isthmus before the construction of the Panama Railroad. This traffic found its way up the Chagres River to the small native town of Cruces, now containing a few scores of people, and then passed overland from that point either on foot or horseback, or by such crude vehicles as the country afforded, to Panama. It was by this route that many people went to California during the gold excitement of 1849 and the years immedi-

ately following. This road has been abandoned for many years, as has the ancient road from Portobello to Panama.

The greater portion of the territory of the Republic is of small elevation, with many large marshes along the seacoast. Even the mountainous portions east and southeast of the railroad, forming the Darien country, are not high, probably in no case exceeding an elevation of 2,800 feet. The arable land on either side of the Isthmus is mostly ground of low elevation.

THE CLIMATE

The climate of the Isthmus is thoroughly tropical in character, but it is by no means entitled to the bad name which is so frequently given to it. In speaking of this climate, all business and social activity in the Republic of Panama is so centered in the vicinity of the railroad line, which is also practically the proposed canal route, that observations as to climatic or other conditions apply strictly to this vicinity, although they are practically the same for other parts of the Republic.

At Panama the Isthmus is scarcely more than forty miles wide. The proximity of the two oceans necessarily affects the climate in a marked manner. The continental divide at this location is low, rising to an elevation but little more than three hundred feet above mean sea level. Winds therefore blow across the entire Isthmus almost unobstructed. Under the tropical sun the evaporation from the two oceans is rapid, and the consequence is an atmosphere highly charged with aqueous vapor at nearly all times. The high temperature of the tropical climate is therefore accentuated with great humidity, which is enervating to a marked degree to those who have been bred in a temperate climate.

The temperature at Colon, on the Caribbean side of the Isthmus, not often rises above 90° Fahr., although it occasionally reaches 98° or even a little higher, as in December, 1885 (98°.2), and January and March, 1886 (98°.2), the latter year being an unusually hot one. The mean of the maximum monthly temperature that year was 95°.2 Fahr. The usual maximum monthly temperature ranges from about 85° Fahr. to about 91° or 92° Fahr. The minimum monthly temperature usually ranges from about 60° Fahr. to about 75° Fahr., the mean minimum monthly temperature being but little under 70° Fahr. The mean temperature throughout the year is not far from 80° Fahr. The interior points of the Isthmus, such as Gamboa and Obispo, about half way across the Isthmus on the railroad line, generally experience maximum temperatures perhaps two or three degrees higher than at Colon, and minimum temperatures perhaps three or four degrees lower than at that point. On the Pacific side the temperature may run a degree or two higher than at Colon. For all ordinary purposes it may be stated that there is no sensible difference in temperature on the two sides of the Isthmus, nor in other climatic conditions except the rainfall, which differs sensibly. On the high ground at Culebra, where the canal and railroad lines cut the continental divide, and where the elevation is from two hundred to three hundred feet above sea level, the air is cooler and dryer than at either seacoast. These figures show that the ruling temperatures on the Isthmus are not so high as those shown by the hottest weather of a New York or Washington summer; but the temperatures, such as they are on the Isthmus, continue without material abatement.

The low latitude of the Isthmus of Panama, the farthest point north lying in latitude 9°, brings the sun at the zenith twice during the year, once at noon on April 13 on its journey northward, and the second time at noon on August 29 on its return southward

toward the winter solstice. At the summer solstice its elevation above the north horizon is 75° 41′ and 57° 24′ above the south horizon at the winter solstice. These conditions introduce an approach to uniformity in the temperature of the varying seasons, as they also produce opposite prevailing winds in different portions of the year. As the direct rays of the sun tend to cause the hot air to rise vertically under it during those portions of the year when the sun is north of the zenith, the prevailing winds are southerly or southwesterly, but when it is south of the zenith the same causes make the prevailing winds from north or northeasterly. It is in this portion of the year when at rare intervals the northers blow into the harbor of Colon with such severity as to require ships found in it to put to sea for their safety.

The year on the Isthmus is divided into the dry season and the wet season. The dry season covers the four months of January, February, March, and April, during which little or no rain falls. The wet season is composed of the remaining eight months of the year, the wettest portions being usually in May and in October. The rainfall on the Caribbean side—*i. e.*, at Colon—is considerably greater than either in the interior or on the Pacific side, its annual amount usually ranging from about 85 to nearly 155 inches, with an average of about 125 to 130 inches. In the interior, as at Gamboa or Bas Obispo, the annual precipitation varies ordinarily from about 75 to nearly 140 inches, with an average of 90 to 95 inches. The total precipitation at Panama, however, may vary from about 45 to about 85 inches per annum, with an average of about 66 to 67 inches. As the average annual precipitation in New York or Washington may vary approximately from 40 to 50 inches, it is seen that the wet season in the Republic of Panama exhibits relatively high rainfall, although not more than about one-half of that which occurs at Greytown, in Nicaragua.

During the wet months there are some phenomenal downpours, with the effect of turning rivers into torrents, and this is particularly the case with the Chagres River, the principal river of the Republic, which empties into the Caribbean Sea about 8 miles west of Colon. Passing up this river from its mouth, its general course lies southeast for a distance of nearly 30 miles to Obispo. Still passing up stream, its course at this point turns sharply to the northeast. From Obispo for a distance of about 23 miles down stream the course of the Panama Railroad and the line of the proposed canal follow the Chagres River to the low lands adjoining the Caribbean coast. In the other direction, however, both the railroad and the canal leave the river at Obispo and cut through the continental divide toward Panama, the Panama end of the canal being about 20 miles from Obispo.

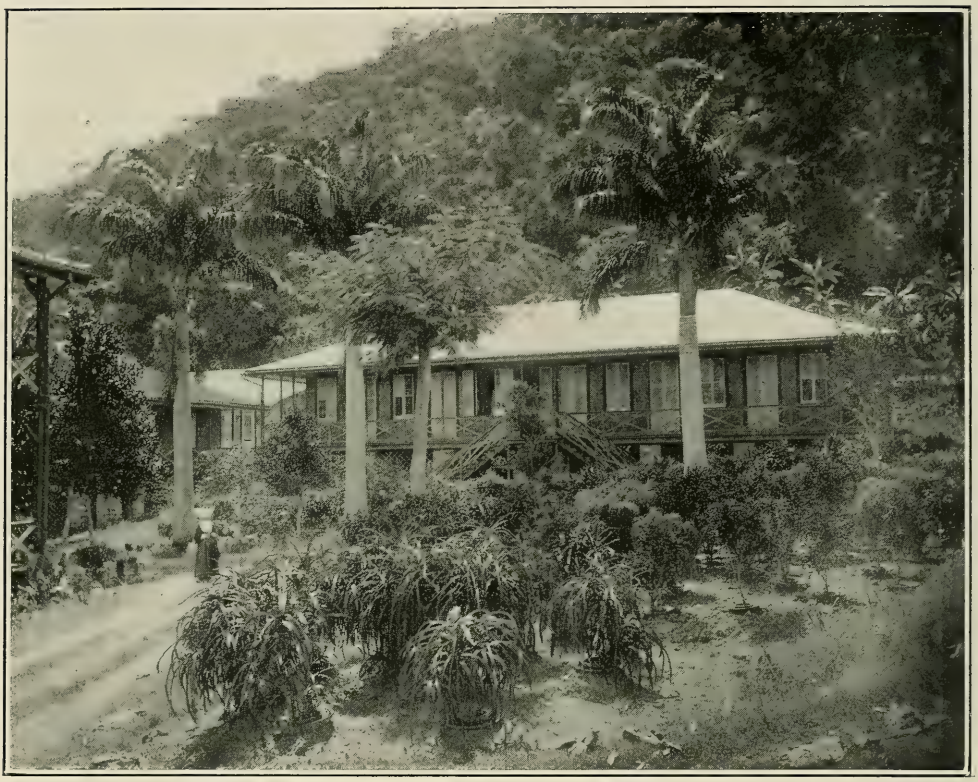
THE VARIOUS PROJECTS FOR A SHIP CANAL

At the present time the greatest interest centering on the Republic of Panama, aside from the remarkable unanimity with which the people of the Isthmus as a unit declared and secured their independence through a single, effective but bloodless effort, is that which attaches to the proposed ship canal connecting the two oceans practically along the line of the Panama Railroad. The project of an Isthmian ship canal is almost as old as the discovery of the Isthmus, for it is nearly 400 years ago that the Spaniards themselves seriously discussed this enterprise. As early as 1520 the Spanish monarch, Charles V, directed a survey to be made for the purpose of determining the feasibility of an isthmian ship canal. From that time until this the project of a ship canal across the Isthmus has been actively dis-

Low Tide in the Harbor of Panama ; the range of tide at Panama is 20 feet, and at Colon only one foot

cussed, although as a result of that early survey the Spanish governor declared "that such a work was impracticable, and that no king, however powerful he might be, was capable of forming a junction of the two seas or of furnishing the means of carrying out such an undertaking." The followers of the Spanish governor were less easily discouraged than he.

The ship-canal enterprise gathered advocates from one century to another, until, during the nineteenth century and the first years of the twentieth, many careful surveys of possible routes across the Isthmus were made. The principal of those lying in the Republic of Panama, beginning with the most easterly, are the Caledonia route, the San Blas route, and the Panama route. The Caledonia route has at times attracted much attention on account of the highly colored but absolutely false accounts rendered of it by one or two early explorers. The northern extremity of this route, at Caledonia Bay, is about one hundred and sixty-five miles east of Colon and crosses the Isthmus in the main in a southwesterly direction. The surveys of the Isthmian Canal Commission showed that the elevation of the divide at this point and the heavy work to be done along its line were far too great to permit its feasibility being considered in comparison with that of the Panama route. The San Blas route,



One of the Hospital Buildings on the Hill Back of Panama

the Caribbean end of which is on the Gulf of San Blas, is about sixty miles east of Colon. This route has the distinguishing characteristic of being located on probably the shortest line between the tide waters of the two oceans on the Isthmus, this distance being scarcely thirty miles. The short length of this line has secured for it a number of earnest advocates. It also was subject to survey by the engineering parties of the Isthmian Commission. The elevation of the divide at this crossing is so great as to necessitate the consideration of a ship tunnel from five to seven miles long, the canal being planned as a sea-level waterway. The great cost of a canal on this line and the hazards attending such a construction as a ship tunnel rendered this route, like the Caledonia line, neither practicable nor feasible, compared with the Panama route.

Many surveys and examinations have been made at different crossings of the Central American isthmus between Tehuantepec, in Mexico, and the eastern limit of the Republic of Panama. As earnest and as enthusiastic as the supporters of other routes have been, the most complete and exact surveys and estimates have shown that the Panama route embodies the greatest number of advantages of any line ever considered for a ship canal between the two oceans. It is a tribute to the sagacity and good

judgment of the old Spanish explorers that they also settled upon practically this route as the most feasible and practicable for the same purpose.

The proposed Panama line, favorably reported upon by the Isthmian Canal Commission and now adopted as the basis of the treaty being negotiated between the United States and the Republic of Panama, begins at Colon and extends in a southeasterly direction to a point on the Bay of Panama near the city of that name, and has a total length of 49.07 miles between the six-fathom curves in the two oceans. At the present time the city of Colon has a population of probably about 3,000 people, while the city of Panama has a population of perhaps 25,000 people. The population scattered along the line of the railroad may add ten to fifteen thousand more, making a total of perhaps forty to forty-five thousand people in the 10-mile strip of territory between the two oceans within which the railroad is found and the canal will be built.

THE PLAN OF DE LESSEPS

This canal route is that which was adopted at the International Scientific Congress convened in Paris in May, 1879, under the auspices of Ferdinand de Lesseps, the concession for the canal having been obtained from the Republic of Colombia in the preceding year by Lieut. L. N. B. Wyse, a French naval officer. This congress not only selected the Panama route, but also decided that the waterway to be constructed should be a sea-level canal. A company entitled "Compagnie Universelle du Canal Interocéanique," and commonly known as the Old Panama Canal Company, was immediately organized to construct the work. After various efforts it financed the enterprise and began work, which was prosecuted until May 15, 1889, when the company went into bankruptcy, and its effects were put into the hands of a liquidator, an officer of the French court corresponding closely to the American receiver.

Prior to the bankruptcy of the old company the project for a sea-level canal was temporarily abandoned in the hope that the funds available might be sufficient for the construction of a lock canal. After various vicissitudes the new Panama Canal Company was organized on the 20th of October, 1894 Work was resumed on the canal immediately thereafter, and has been continued until the present time, the force employed, however, being small. The old company raised by the sale of stocks and bonds not far from $246,000,000, and it has been stated that the number of persons holding the securities was over two hundred thousand.

When the concession for building the Panama Railroad was secured from the Colombian Government, control of all available transportation routes across the Isthmus in the territory of the present Republic of Panama was covered by it. The construction of the ship canal by the old Panama Canal Company was therefore subject to the rights conveyed in the Panama Railroad concession. In order to control this feature of the situation, therefore the old Panama Company purchased nearly the entire stock of the railroad company, which thus became a part of the assets of the new Panama Canal Company.

THE RECOMMENDATIONS OF THE ISTHMIAN COMMISSION

When the Isthmian Canal Commission made its first visit of investigation of the canal routes four years ago, it found a large amount of excavation and other work done along the line of the canal, as well as a large amount of land, buildings, structures, and many plans and papers, all constituting a part of the property of the new Panama Canal Company. All this property was situated on

the Isthmus except a mass of plans and papers in the office of the canal company at Paris. The Commission in its report, under date of November 16, 1901, recommended, in case of selection of the Panama route, payment of $40,000,000 to the new Panama Canal Company for all its property, rights, and concessions connected with the unfinished canal. That offer, as made by the United States Government, has since been accepted by the French company.

The Isthmian Canal Commission adopted the French line for its estimates, but made some material changes in the plans for the work. The canal as planned by the Commission is a lock canal, its typical or standard section for firm earth having a bottom width of 150 feet, a minimum depth of water of 35 feet, and a top width of 269 feet. This section is suitably modified for harbor sections, for sections in soft ground, for sections in rock and in lakes and wherever required by unusual conditions. These adopted sections would afford ample waterway for the greatest ships afloat at the present time, as required by the law creating the Commission.

The locks for this canal are great masonry constructions, having a usable length of 740 feet with a clear width of 84 feet, more than large enough to accommodate any vessel now afloat or planned to be built.

Beginning at the 6-fathom curve in the harbor of Colon, the canal is planned to be excavated for a distance of 7 miles through the low, marshy grounds in that vicinity to Gatun, where the line meets the Chagres River. From that point to Bohio, about 17 miles from Colon, a little east of south from the point of starting, the canal would be excavated generally along the marshy lowlands through which the Chagres River flows in that vicinity, cutting the course of that river four or five times. This 17-mile section of the canal is a sea-level section, but at Bohio is found a comparatively narrow place in the valley of the Chagres River with rock outcroppings on one side and at which a dam may be built. At this point it was the purpose of the French company also to build a dam, but the Isthmian Canal Commission provisionally located its dam at a site nearly half a mile downstream from that of the French dam, and proposes to build it materially higher.

THE GREAT DAM AT BOHIO

This dam would retain behind it the waters of the Chagres River at an elevation varying from 85 feet to 90 or 92 feet above mean sea level, thus forming what has been called Lake Bohio. It would back up the water of the Chagres River for a distance of about 20 miles, through about 14 of which the course of the canal would be laid. Lake Bohio would constitute the summit level of the canal, and would be reached by two great masonry locks built together, *i. e.*, in series near one end of the dam at Bohio, the lift of each one of these two locks being 45 feet as a maximum. These locks would be built as twin structures, so that if an accident should happen to one side the other side would still be available for use, and thus save the operation of the canal from being broken. A great ledge of rock affords an excellent site for the construction of these locks.

The building of this great dam at Bohio, with its top nearly 100 feet above the water in the river in its normal condition, is one of the great works of the entire canal construction. As the safety and operation of the canal would depend entirely upon the stability of this dam, the Commission recommended a plan of construction by which a masonry core wall 30 feet thick at the bottom and 8 feet at the top would be built up from the rock beneath the bed of the river to the top of the dam, thus efficiently preventing all leakage of water through the

A Market Scene in Panama

porous sand and gravel, of which large portions of the substrata beneath the river bed are composed.

As the top of this dam would have an elevation of 100 feet above the sea, and as the highest water in Lake Bohio would be 8 feet lower than that elevation, no water would ever overflow this dam, but the surplus of flood waters of the Chagres River would be discharged over a masonry spillway about 3 miles from the dam. The spillway weir would be of masonry and about 2,000 feet long. Its location is in a notch or depression in the ridge between the headwaters of a small tributary of the Chagres called the Gigante and the valley of the Chagres River. The crest of this 2,000-foot-long overflow would be 85 feet above sea level. It is estimated that with the greatest flood possible in the Chagres River the depth of water on the overflow weir would not be greater than 7 feet. During a great flood, therefore, the river would discharge into this lake, and its waters would accumulate there until deep enough to run over the masonry spillway. With the flood in a rising stage, the amount flowing over the spillway would increase

up to the greatest flood height, after which the rate of discharge over the spillway would decrease. This regulation of the Chagres floods, therefore, takes care of itself. It requires no attention. After discharging over the spillway, the flood waters would flow through an artificial channel down into the Chagres River beyond any of the canal works and where no damage would be done.

About 10 miles up the Chagres from Obispo at a point called Alhajuela there is an excellent site for a dam. It has been proposed to build at this Alhajuela site a great masonry dam for the purpose of impounding flood waters of the Chagres River to the extent of the storage capacity behind the dam, and so reduce the flood effects in Lake Bohio. This storage reservoir would also act as a source of feed water for the canal should the traffic on it in the future become so large as to require this additional supply.

THE CULEBRA CUT

From Obispo, 30 miles from Colon, the canal line runs toward the southeast through the continental divide in a direct course toward Panama, and for nearly 7 miles from Obispo a great cut has to be made through the high ground forming that divide. For a distance of about 5 miles from Obispo this is known as the Emperador Cut, beyond which lies a mile and a half known as the Culebra Cut. The greatest depth of this cut at Culebra is about 250 feet, and the amount of material to be removed in this stretch of 7 miles of canal excavation is about 43,000,000 cubic yards. It is the greatest single feature of the entire canal construction.

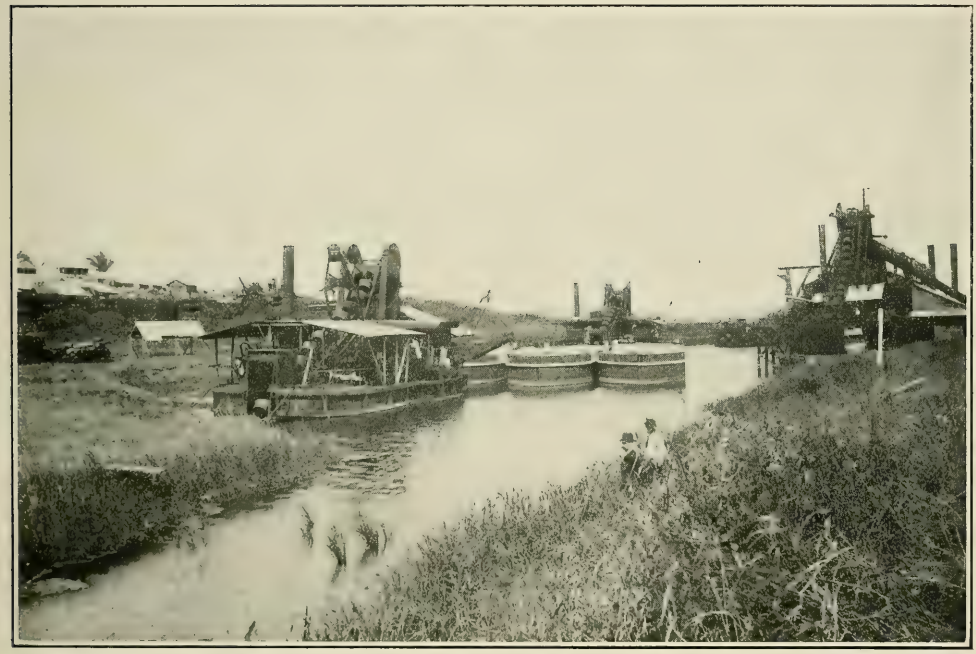
The summit or Bohio Lake level ends at a point called Pedro Miguel, about 1½ miles southeasterly of the Culebra Cut and 38 miles from Colon, where is located a flight of two locks arranged in twin plan like the others, each one of the pair having a lift varying from 27 to 31 feet, according to the varying height of water in Lake Bohio. By means of these two locks the water surface in the canal is brought down to an elevation about 28 feet above sea level. The last lock on the line is at a point called Miraflores, a little less than a mile and a half from the Pedro Miguel locks. From Miraflores to the end of the canal, at a point called La Boca on the Bay of Panama, is less than 5 miles, and this portion of the canal constitutes what may be called the Pacific section or level. The water of this Pacific section of the canal rises and falls coincidently with the tides in the Bay of Panama, and as the range of tide in that bay is about 20 feet, the Miraflores lock is largely a tidal lock. Its minimum lift, therefore, at high tide, is 18 feet, while the maximum lift at low tide is 38 feet. It is obvious from these tidal conditions that if the canal were constructed as a sea-level canal a tidal lock would be needed at or near its Pacific end. That part of the canal line between Miraflores and the Bay of Panama is located closely along the course of the Rio Grande, which is mainly a tidal river, its two principal tributaries above Miraflores being Rio Pedro Miguel and Rio Caimitillo, both being small and insignificant streams.

The length of canal between the shore lines is about 44 miles, although the length between the 6-fathom curves on the two sides of the Isthmus, as has already been stated, is 49 miles, 13 of which lie in the artificial Lake Bohio. The creation of Lake Bohio would necessitate the relocation and rebuilding of the railroad between Bohio and Obispo, throwing it back upon higher ground.

No canal with locks can be operated without provision for the water used in taking boats through the locks, for evaporation, for seepage, and for other purposes incident to maintenance and operation of the canal. At each lock-

age on the Panama canal a lock full of water, representing a volume nearly 750 feet long, 84 feet wide, and 45 feet deep, would be used in the Bohio locks and about two-thirds as much in the Pedro Miguel locks. This requires a large supply of water, which the Isthmian Commission computed for all purposes to be 1,070 cubic feet per second for an annual traffic of 10,000,000 tons passing through the canal. This water supply is afforded by the Chagres River, and without it or its equivalent the canal would not be possible.

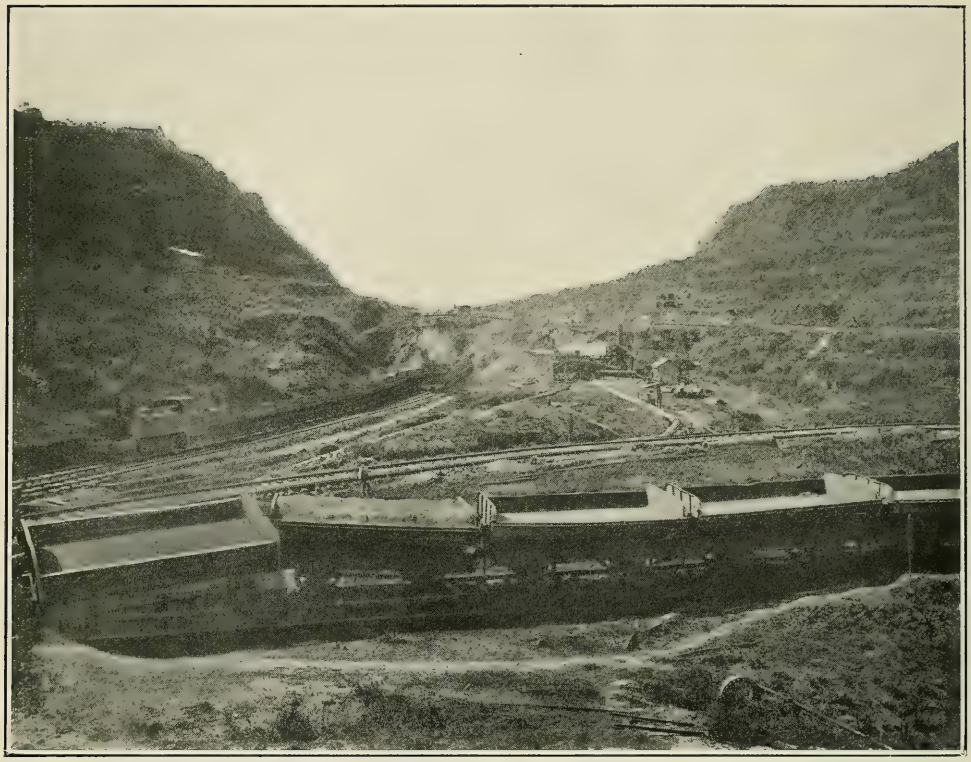
In view of the complete system of self-control of the Chagres floods by the Gigante Spillway, the Chagres River, instead of being an insurmountable obstacle to the construction and maintenance of the canal, as has at times been apprehended, is actually a gracious feature of the canal environment, and by that automatic control it has been changed from a sinister agent to a friendly power. Furthermore, while the average discharge of the Chagres River is nearly three times the quantity required for feeding the canal, there are times in the dry seasons when the discharge of the river is not more than two-thirds of the quantity required for that purpose. This deficiency is abundantly made up by the storage in Lake Bohio until the traffic exceeds 10,000,000 tons annually. At that time the storage in the Alhajuela reservoir will give an additional supply for an increase of traffic three or four times as great as the volume which can be accommodated by the storage in Lake Bohio.



Cutting the Canal through Morasses, Chagres River Region

ABOMINABLE SANITARY CONDITIONS

The sanitary conditions of the Isthmus are at the present time wretchedly bad.



The Culebra Cut

Neither Colon nor Panama has either a system of water supply or a sewer system. The water used in Panama for potable purposes is brought into the city in casks mounted on wheels and drawn by mules from some more or less polluted source outside of but near the city, or caught in cisterns from the rain water flowing from roofs during the wet season, or in some other crude and usually unsanitary way.

There are a few drains in the city of Panama, constructed immediately under the surface of the streets, with little or no regard to grades. The water or sewage and decaying matter collecting in the low portions of these drains and remaining there under the high temperature of the climate make them far worse than no drains at all. The lack of care and proper disposal of household and other refuse creates the most unsanitary conditions imaginable. These observations may be emphasized for the smaller towns and villages between Colon and Panama. As a consequence, yellow fever is probably always present, and at times assumes epidemic form. Malarial fevers and other similar diseases are also continually present under aggravated forms. These conditions, however, are completely remediable by means well known and available at the present time.

The entire Isthmus can be placed in a completely sanitary condition so that its healthfulness shall be assured by resorting to methods and means which have now become practically standard in the

sanitation of cities and towns. It is absolutely essential that water works, supplying potable and wholesome water, be established for the cities and larger towns, and concurrently therewith there must be established suitable sewer systems with rational and sanitary disposal of sewage. All these results are now perfectly practicable of attainment without unreasonable cost or material difficulty. It will be imperative, however, that sanitary regulations be created, enforced, and maintained with the rigor of military discipline. Under such reasonable sanitary conditions as it is entirely practicable to attain, and with proper quarantine regulations, there is no reason why the Isthmus may not be maintained entirely free of yellow fever or from other tropical epidemics.

COST OF THE CANAL

The United States Government has entered into a provisional agreement to purchase the entire property of every description and the rights of the new Panama Canal Company for the sum of $40,000,000. The cost of completing the Panama Canal under the plan of the Isthmian Canal Commission is estimated by that Commission at $144,233,358. The sum of these two amounts—$184,233,358—represents the total cost of the construction of the isthmian ship canal by this route, to which should be added such additional costs as are required to be incurred in securing the additional rights and concessions necessary to enable the United States Government to enter upon the Isthmus and begin the work.

The consummation of this great work is apparently close at hand. The creation of the Republic of Panama has solved the difficulties which had gathered about the negotiations of the requisite treaty, and it will probably be but a short time before this, the greatest engineering work of the world, will be undertaken and carried to completion. This achievement will not only create new lines of ocean commerce and stimulate some of the older lines into new life, but it will also bring the Atlantic and Pacific shores of the United States into much closer communication than before, thus strengthening those bonds of mutual interest and natural sympathy which lie at the foundation of best national life. In this part of the world's development the new Republic of Panama becomes the center of the material activities through which these great results will be accomplished, thus attaining the fruition of 400 years of effort. She is to be congratulated in marking her entrance among the nations of the earth by opening the way to the attainment of this world improvement and giving the work the impetus of her national sanction.

THE following table shows that the Panama Canal will bring New York much nearer to Hongkong and Yokohama, to the markets of the East, than Hamburg :

From	To	By way of Cape Horn.	By the Suez Canal.	By the Panama Canal.	Advantage in favor of Panama.
Hamburg	Hongkong	18,480	10,542	14,933	.....
New York	Hongkong	18,180	11,655	9,835	1,820
Hamburg	Yokohama	17,979	12,531	13,024	.....
New York	Yokohama	17,679	13,464	9,835	3,729
Hamburg	Melbourne	13,802	12,367	13,198	.....
New York	Melbourne	13,502	.....	10,427	2,863
Hamburg	San Francisco	15,140	.....	8,488	6,652
New York	San Francisco	14,840	.....	5,299	9,541

EIGHTH INTERNATIONAL GEOGRAPHIC CONGRESS, WASHINGTON, 1904.

THE Executive Committee of the Seventh International Geographical Congress, held in Berlin in 1899, having voted to convoke its next session in Washington, the National Geographic Society, as the organization responsible for the management of the sessions in the United States, will welcome the Eighth Congress and its friends in September, 1904.

Geographers and promoters of geography throughout the world, especially members of geographic societies and cognate institutions of scientific character, are cordially invited to assemble in Washington, D. C., September 8, 1904, for the first international meeting of geographers in the Western Hemisphere.

On the invitation of the National Geographic Society, the following societies join in welcoming the Congress, and undertake to coöperate toward its success, especially in so far as sessions to be held in their respective cities are concerned:

The American Geographical Society.
The Geographical Society of Philadelphia.
The Appalachian Mountain Club.
The Geographical Society of the Pacific.
The Sierra Club.
The American Alpine Club.
The Harvard Travellers' Club.
The Geographic Society of Baltimore.
The Geographic Society of Chicago.
The Geographical Society of California
The Mazamas.
The Peary Arctic Club.

SESSIONS AND EXCURSIONS

The Congress will convene in Washington on Thursday, September 8, in the new home of the National Geographic Society, and will hold sessions on the 9th and 10th, the latter under the auspices of the Geographic Society of Baltimore. Leaving Washington on the 12th, the Members, Associates, and guests of the Congress will be entertained during that day by the Geographical Society of Philadelphia, and on the 13th, 14th, and 15th by the American Geographical Society in New York, where scientific sessions will be held; on the 16th they will have the opportunity of visiting Niagara Falls (en route westward by special train) and on the 17th will be entertained by the Geographic Society of Chicago, and on Monday and Tuesday, September 19 and 20, they will be invited to participate in the International Congress of Arts and Science connected with the World's Fair in St. Louis. Arrangements will be made here for visiting exhibits of geographic interest. In case any considerable number of Members and Associates so desire, a Far-west excursion will be provided from St Louis to the City of Mexico, thence to Santa Fé; thence to the Grand Canyon of the Colorado, and on to San Francisco and the Golden Gate, where the western geographic societies will extend special hospitality; afterward returning by way of Mt Shasta and Portland and through the northern Rocky Mountains and the interior plains to the eastern ports.

If the membership and finances warrant, the foreign delegates will be the guests of the Congress from Washington to St Louis via Baltimore, Philadelphia, New York, Niagara Falls, and Chicago. On the general excursion special terms will be secured, reducing the aggregate cost of transportation, with sleeping-car accommodations and meals materially below the customary rates. It will be necessary to limit the number of persons on the Far-west excursion. It is planned also to secure special rates for transportation of foreign members from one or more European ports to New York, provided requisite

information as to the convenience and pleasure of such members be obtained in time. Final information on these points will be given in the preliminary program of June, 1904.

MEMBERSHIP

Members of the Congress will be entitled to participate in all sessions and excursions, and to attend all social meetings in honor of the Congress; they will also (whether in attendance or not) receive the publications of the Congress, including the daily program and the final volume of proceedings.

Membership may be acquired on payment of $5 (25 francs, 1 pound, or 20 marks) to the committee of arrangements. Persons not members of such societies may acquire membership by a similar payment and election by the presidency. Ladies and minors accompanying members may be registered as associates on payment of $2.50 (12½ francs, or 10 shillings, or 10 marks); they shall enjoy all privileges of members except the rights of voting and of receiving publications.

Geographers and their friends desirous of attending the Congress or receiving its publications are requested to signify their intention at the earliest practicable date in order that subsequent announcements may be sent them without delay, and that requisite arrangements for transportation may be effected. On receipt of subscriptions, Members' and Associates' tickets will be mailed to the subscribers. The privileges of the Congress, including the excursions and the social gatherings, can be extended only to holders of tickets.

It is earnestly hoped that the Congress of 1904 may be an assemblage of geographic and cognate institutions no less than of individual geographers; and to this end a special invitation is extended to such organizations to participate in the Congress through delegates, on the basis of one for each 100 members up to the maximum of 10.

PUBLICATIONS

The publications of the Congress will be sent free to all institutions registered. No charge will be made for the registration of institutions, though the Delegates will be expected to subscribe as Members; and in order that the list of affiliated institutions (to be issued in a later announcement) may be worthy of full confidence, the committee of arrangements reserve the right to withhold the name of any institution pending action by the presidency. It is especially desired that the geographic societies of the Western Hemisphere may utilize the opportunity affordedby this Congress for establishing closer relations with those of the Old World, and to facilitate this Spanish will be recognized as one of the languages of the Congress, with French, English, German, and Italian, in accordance with previous usage; and communications before the Congress may be written in any one (or more) of these languages.

Institutions not strictly geographic in character, libraries, universities, academies of science, and scientific societies are especially invited to subscribe as members in order to receive the publications of the Congress as issued.

SUBJECTS FOR DISCUSSION

The subjects for treatment and discussion in the Congress may be classified as follows:

1. Physical Geography, including Geomorphology, Meteorology, Hydrology, etc.
2. Mathematical Geography, including Geodesy and Geophysics.
3. Biogeography, including Botany and Zoology in their geographic aspects.
4. Anthropogeography, including Ethnology.
5. Descriptive Geography, including Explorations and Surveys.

6. Geographic Technology, including Cartography, Bibliography, etc.

7. Commercial and Industrial Geography.

8. History of Geography.

9. Geographic Education.

A special opportunity will be afforded for the discussion of methods of surveying and map-making, and for the comparison of these methods as pursued in other countries with the work of the great federal and state surveys maintained in this country.

Members and delegates desirous of presenting communications before the Congress, or wishing to propose subjects for discussion, are requested to signify their wishes at the earliest practicable date, in order that the titles or subjects may be incorporated in a preliminary program to be issued in June, 1904. The time required for presenting communications should be stated; otherwise twelve minutes will be allotted. It is anticipated that not more than twenty minutes can be allotted for any communication, unless the Presidency decide to extend the time by reason of the general interest or importance of the subject. The Presidency, with the complete organization of the Congress (including delegates), will be announced in the preliminary program of June, 1904.

All papers or abstracts designed for presentation before the Congress, and all proposals and applications affecting the Congress, will be submitted to a Program Committee, who shall decide whether the same are appropriate for incorporation in the announcements, though the decisions of this committee shall be subject to revision by the Presidency after the Congress convenes.

Any proposal affecting the organization of the Congress or the program for the Washington session must be received in writing not later than May 1, 1904. Communications designed to be printed in connection with the Congress must be received not later than June 1, and any abstracts of communications (not exceeding 300 words in length) to be printed in the general program to be published at the beginning of the session must be received not later than August 1, 1904. Daily programs will be issued during the sessions.

All correspondence relating to the Congress and all remittances should be addressed to the Eighth International Geographic Congress, Hubbard Memorial Building, Washington, D. C.

THE PRESIDENCY

The Presidency up to the time of the assembling of the Congress will consist of the President of the Congress, the Chairman of the Committee of Arrangements, the Treasurer of the Congress, the Chairman of the Committee on Scientific Program, and the Secretary of the Committee of Arrangements. After the assembling of the Congress, the Presidency will consist of the foregoing officers and the Vice-Presidents.

COMMITTEE OF ARRANGEMENTS

W J McGee, National Geographic Society, Chairman.

Henry G. Bryant, Geographical Society of Philadelphia.

George B. Shattuck, Geographic Society of Baltimore.

A. Lawrence Rotch, Appalachian Mountain Club, Boston.

Zonia Baber, Geographic Society of Chicago.

George Davidson, Geographical Society of the Pacific, San Francisco.

Frederick W. D'Evelyn, Geographical Society of California, San Francisco.

John Muir, Sierra Club, San Francisco.

Rodney L. Glisan, Mazamas, Portland.

Angelo Heilprin, the American Alpine Club.

Herbert L. Bridgman, Peary Arctic Club.

William M. Davis, Harvard Travellers' Club.

J. H. McCormick, Secretary.

FINANCE COMMITTEE

John Joy Edson, Chairman, President Washington Loan and Trust Company.

Charles J. Bell, President American Security and Trust Company.

David T. Day, United States Geological Survey.

COMMITTEE ON SCIENTIFIC PROGRAM

William M. Davis, Chairman, and Angelo Heilprin, George B. Shattuck, G. K. Gilbert, Henry Gannett, William Libbey, Cyrus C. Adams, and Henry G. Bryant.

COMMITTEE ON TRANSPORTATION

David T. Day, Chairman, and L. W. Busbey, H. L. Bridgman, and Miss Zonia Baber.

COMMITTEE ON BADGES

R. E. Dodge, Chairman, and H. G. Bryant.

COMMITTEE ON PRESS

H. L. Bridgman, Chairman.

COMMITTEE ON PUBLICATIONS

Henry Gannett, Chairman.

THE PHILIPPINE WEATHER SERVICE

THE Philippine Weather Service is one of the most important, if not the most important, of the scientific bureaus of the insular government, not only because of the high character of its scientific work, but also for its practical value to human life and to the industries.

It may be said to have originated in 1865, with the establishment of the Manila Observatory, which was originated and carried on for many years by the Society of Jesus. At the beginning the observatory was equipped with the essential meteorological instruments, and as means were afforded from time to time others were added, until by 1870 it was thoroughly well equipped with instruments.

From the beginning systematic observations were made, and published monthly. It was not, however, until 14 years later, in 1879, that the first practical result was reached in the form of storm warnings. Meanwhile, however, studies had been made of the general meteorologic conditions of the neighborhood of Manila, in the light of the observations made at the observatory, and special study of the typhoon, or baguio, as the concentrated cyclone common in this neighborhood is locally known.

The Philippine Islands are swept by the easterly trade winds from November to May, and from June to October by the southwest monsoon. East of these islands the southwest monsoon of the summer meets the steady easterly trade wind, and here whirls of different velocity and intensity are often set up, which, moving at first westerly with the trades, swing around to the north and northeast as they get well within the region of the southwest monsoon. These are the typhoons so similar to our West Indian hurricanes. The Philippine Islands are directly in their track, and the monsoon season is the typhoon season. It is the prevalence of these storms, so destructive to life and property, that makes a weather service of such exceeding importance.

The course and character of the typhoon of July 7 of the year 1879 were predicted, and much suffering was thereby avoided. The typhoon of November 18 was also predicted, and in consequence of the warning all shipping was held in Manila Bay, resulting in trifling loss, although the typhoon was very severe.

In the three following years fifty-three typhoons were predicted, and in nearly every case the predictions were verified. Upon the completion of the Hongkong-Manila cable, storm warnings were transmitted from Manila to Hongkong, and, as the storms usually occupy two days in transit, ample warning was given to the people of that colony.

In 1884 the meteorological service of the Observatory of Manila was adopted by the Spanish Government by royal order, and was greatly extended by the establishment within the three following years of thirteen secondary stations, all upon the Island of Luzon. All these stations were fully equipped with instruments and connected by telegraph with the central observatory at Manila, to which were wired full meteorological data each day. Besides these second-class stations, fourteen other stations, which may be denominated third-class, were established, principally in the Visayan Islands and in Mindanao, which were not connected by telegraph, and which transmitted their records monthly by mail.

On May 22, 1901, the Philippine Weather Bureau was establlshed by act of the Philippine Commission. It was, in effect, simply the adoption of the former organization, but many extensions and improvements immediately followed. The act provides for a director and three assistant directors for a central observatory; 9 first-class, 25 second-class, 17 third-class, and 20 rain stations, and for observers and instruments to man and equip them.

The rapid extension of the telegraph to all parts of the archipelago made it possible to extend greatly the area covered by stations reporting daily by telegraph, and the usefulness of the service was thus much increased.

The Philippine Weather Service publishes no daily map, but in place thereof furnishes records of the principal meteor data daily to the press and to the officers of the chief ports. Also, when any serious atmospheric disturbance is impending, such as a typhoon, frequent observations are made at all stations even remotely involved, and the port authorities and other local officers of the region concerned are kept closely informed of its movements and character.

It publishes a monthly summary of the weather, much on the plan of our *Monthly Weather Review*, besides numerous miscellaneous publications. It has close relations with the U. S. Weather Bureau and with similar organizations in Europe. Its storm warnings are furnished the principal Chinese and Japanese ports, where they have proved of infinite service to commerce.

The originator of the observatory was Reverend Padre Faura. To him is due its growth and equipment, its establishment as a government institution, and its system of storm warnings. The present director, Reverend Father Algué, needs no introduction, since he is the leading geographer and meteorologist of the Philippine Islands. What his predecessor built he has ably carried out and improved. H. G.

BY order of the Governor of the Philippines, a special committee has been appointed to pass on the spelling of Philippine names. The committee consists of Dr T. H. Parde de Tavera, Philippine Commissioner; the Chief of the Bureau of Coast and Geodetic Survey, the Chief of the Bureau of Ethnological Survey, the Chief of the Bureau of Public Lands, the Director of Posts, and Manuel X. Burgos, and is called the "Philippine Committee of Geographical Names." The committee is to discharge the same duty in respect to Philippine names as has heretofore been discharged by the Board on Geographic Names appointed by President Harrison in 1890. The committee was appointed in accordance with a suggestion of Mr Henry Gannett that the Filipinos would be better able to decide on their own names than the United States Board.

GEOGRAPHIC NOTES

SOME FACTS ABOUT KOREA

THE foreign commerce of Korea amounts to about fifteen millions of dollars, of which two-thirds are exports. It is difficult to learn how much the United States sends Korea, as much of what we send goes by way of China and Japan and is not directly credited to us. In 1903 the value of American exports to Korea, of which there is record, amounted to about $400,000, but it is probable that our actual exports to the country reached double that amount.

The trade of Korea with Japan is growing more rapidly than with any other country, the importation of cotton goods from Japan amounting to from two to three million yen annually (one yen equals 50 cents). Cotton goods are the largest single article in the value of importations into Korea, amounting to between six and seven million yen annually. Silk goods amount to about one and a half million yen per annum. The chief articles of export are rice, 4¼ million yen in value; beans, 2 million yen; hides, 650,000 yen; and ginseng, 527,000 yen.

The currency chiefly consists of copper cash and nickel coins, gold and silver coins being out of circulation. The total currency is stated as aggregating about $22,000,000, of which $6,000,000 is copper cash, $14,000,000 nickel, $1,550,000 Japanese coins, and $530,000 Korean silver dollars.

The minerals of Korea are of considerable value. Copper, iron, and coal are reported as abundant, and gold and silver mines are being successfully operated, an American company having charge of and operating a gold mine at the treaty port of Wunsan under a concession granted in 1895. Concessions have also been granted to Russian, German, Japanese, and French subjects.

Railways, telegraphs, telephones, and a postal system have been recently introduced into Korea. A railway from the seaport of Chemulpo to Seoul, the capital, a distance of 26 miles, was built by American contractors, and has reduced the time between the seaport and capital from eight hours to one and three-quarter hours. The Seoul Electric Company, organized chiefly by Americans and with American capital, has built and operated an electric railway near Seoul, which is much used by the natives. This electrical plant is said to be the largest single electrical plant in Asia. The machinery is imported from the United States, and the consulting engineer, a Japanese, is a graduate of the Massachusetts Institute of Technology.

Transportation in the interior is chiefly carried on by porters, pack horses, and oxen, though small river steamers owned by Japanese run on such of the streams as are of sufficient size to justify the use of steamers. The postal system is under French direction and has, in addition to the central bureau at Seoul, 37 postal stations in full operation and 326 substations for registered correspondence.

The area of Korea is estimated at 82,000 square miles, or about equal to that of the State of Kansas. The population is variously estimated at from eight to sixteen millions. The foreign population consists of about 30,000 Japanese, 5,000 Chinese, 300 Americans, 100 British, 100 French, 100 Russians, 50 Germans, and about 50 of various other nationalities.

Pile of Beets by Railroad Track Awaiting Shipment, Minnesota Sugar Company. St. Louis Park, Minn.

Mention has often been made in this Magazine of the many and varied industries which have been created and encouraged in the United States by the Department of Agriculture. One of the most successful of these is the beet-sugar industry. In 1896 the sugar made from beets in this country amounted to 29,220 tons. As a result of the persistent pushing of Secretary Wilson, last year, 1903, it amounted to 260,000 tons, a ninefold increase in seven years.

Hoeing Beets, near Ames, Nebraska

There are many sections of the country where the soil is just what is needed for growing the sweetest and richest beets. Under most favorable conditions, the beet-sugar grower has sometimes netted $100 to $150 an acre. Next to a loose rich soil, the chief requisite is a large number of available laborers, and a sugar factory near at hand. The principal beet-sugar states are California, Michigan, Colorado, Utah, and Nebraska.

Photograph by F. M. Chapman, American Museum of Natural History

An Abandoned Colony of Flamingo Nests, Bahama Islands

Dr Chapman counted 2,000 nests in this colony. Each nest is about 18 inches in diameter and 12 inches high, and is made of mud which the bird scoops up from the bottom. In the bowl at the top of this adobe dwelling the female lays a single white egg. Of the period of incubation, condition of the young at birth, manner of feeding, etc., practically nothing is known. The birds select a new spot for their colony each year. As the site chosen is only a few inches above sea-level, the height of the nests depends on the rise of the water by tides or floods.

IN TRIBUTE TO MARCUS BAKER

THE following resolutions were unanimously adopted by the U. S. Board on Geographic Names at its last meeting :

Whereas death suddenly removed, on Saturday, December 12, 1903, the faithful Secretary of the United States Board on Geographic Names, Mr. MARCUS BAKER, be it resolved :

1. That, realizing keenly the void caused thereby in our Board, we, his colleagues, give this public expression to our warm appreciation of his private character, and of the unflagging interest with which Mr. Baker served this organization almost from the beginning, as Secretary and Editor.

2. We join the scientific men of Washington in deploring the loss of a brilliant mathematician, an efficient officer, a rare organizer, and a man alive with enthusiasm over efforts made for the increase and diffusion of knowledge.

3. We unite with all who knew him in mourning over the death of a good man, a warm friend, a wise counsellor, and a public-spirited citizen.

4. Especially do we sympathize with his devoted wife and family in their sad bereavement of a loving husband and a devoted father. At the same time, we would console them in their dark hour with assurances that our common friend has left behind him fragrant memories of a beautiful and successful life.

The remarkable photograph of flamingo nests on page 82 was taken by Mr F. M. Chapman on a recent trip to the Bahama Islands for the American Museum of Natural History. Only one flock of flamingoes is now known to inhabit the United States, and the nesting grounds of this flock have not yet been discovered, though they are somewhere in the vicinity of Cape Sable, Florida. Formerly the flamingo was quite common on the coasts of Southern United States, but the deep vermilion of its plumage, set off by black wing quills, made it too attractive to the plumage hunter. Dr Chapman brought back several of the nests which are now on exhibition at the American Museum.

"Area, population, commerce, revenue, expenditures, indebtedness, currency, and stocks of money of the principal countries of the world" is the title of a statement just issued by the Department of Commerce and Labor through its Bureau of Statistics. The statement includes all countries and colonies for which statistics of commerce and the other conditions above mentioned are available, and thus presents an approximately complete picture of commercial and financial conditions throughout the entire civilized world.

GEOGRAPHIC LITERATURE

Central Asia and Tibet. By Sven Hedin. With 8 illustrations in color, 16 drawings by distinguished artists, 400 photographs, and 4 maps. In 2 vols. Large 8vo. New York : Chas. Scribner's Sons. 1903. $10 50 *net.*

The public have followed with extraordinary and deserved interest the remarkable explorations of Sven Hedin in Turkestan and Tibet, 1899–1902, and have awaited the publication of his narrative with impatience. The work was hurried through the press, and appeared in two handsome volumes during the last month of 1903, simultaneously in eleven different editions, in eleven widely separated cities, and in nine different languages. It was translated from the Swedish by Mr J. T. Bealby, who several years ago translated

"Through Asia" for Dr Hedin. The translation is admirably done, and reads as smoothly as if originally written in English, while at the same time it preserves the fanciful diction of the author. The English edition of the work is dedicated, with the gratitude and admiration of the author, to Lord Curzon.

It is possible to mention here only a few of Dr Hedin's more notable achievements during the last journey: His navigation of 1500 miles in a ferry-boat down the River Tarim, the greatest inland river of Asia; his discoveries of the remains of populous cities dating from the 3d century A. D., with translations of Chinese manuscripts, there unearthed; his crossing of the mountains of Tibet with the largest and strongest caravan which has ever traversed that country; his extraordinary journey in disguise towards Lhasa; his discovery of Tibetan spies warned of his intention to enter Lhasa; his captivity and escort by 500 Tibetans; his conflicts with them, and his voyage in an English folding boat over twelve Tibetan lakes.

Dr Hedin's descriptions throughout are most graphic which adds immensely to the interest and value of his book. One of the best is his account of a sand storm in the desert.

"It drove right into my face with terrific violence, smothering me with sand and fine reddish-yellow powdery dust. I could not see a single glimpse of the caravan. It was like wading against running water or liquid mud, and despite my most desperate efforts, I was unable to make headway. My previous footprints were entirely obliterated—obscured the instant I lifted my foot. . . .

"The camels knelt in a long row, with their necks stretched out flat on the ground in the direction in which the tempest was blowing. Close to the earth the wind had a velocity of 40½ miles an hour; but on the top of an adjacent mound, only 6 or 7 feet high, it was some 18 miles an hour more, or 58½ miles in all, and I was only able to keep my balance when I knelt. The storm came from the northeast, and its violence enabled me to form some idea of the inconceivable quantities of sand and dust which are transported by this mighty agent towards the regions of the west and southwest. When we stooped down we were well nigh choked by the swirling cloud, which careered along the ground like a cataract, making little eddies of dust as it swept on. Branches, tufts of grass, grains of sand as big as peas were whirled into our faces with stinging force."

When Dr Hedin reached his tent after the storm he found that showers of fine sand had penetrated through the canvas and smothered everything in the interior.

Climbs and Explorations in the Canadian Rockies. By Hugh E. M. Stutfield and J. Norman Collie. With many illustrations and map. Pp. 342. 5½ by 9 inches. New York: Longmans, Green & Co. 1903. $4.00 *net.*

This is an interesting narrative of travels in the mountains of Canada. It truthfully portrays the difficulties of the traveler and climber in reaching his goal when situated at such a distance from the base of supplies. The chapter giving an outline history of the region is interesting in its list of names, ranking with our own pioneers, Lewis and Clarke.

The details of conditions met with are of value to those visiting the region as prospective climbers.

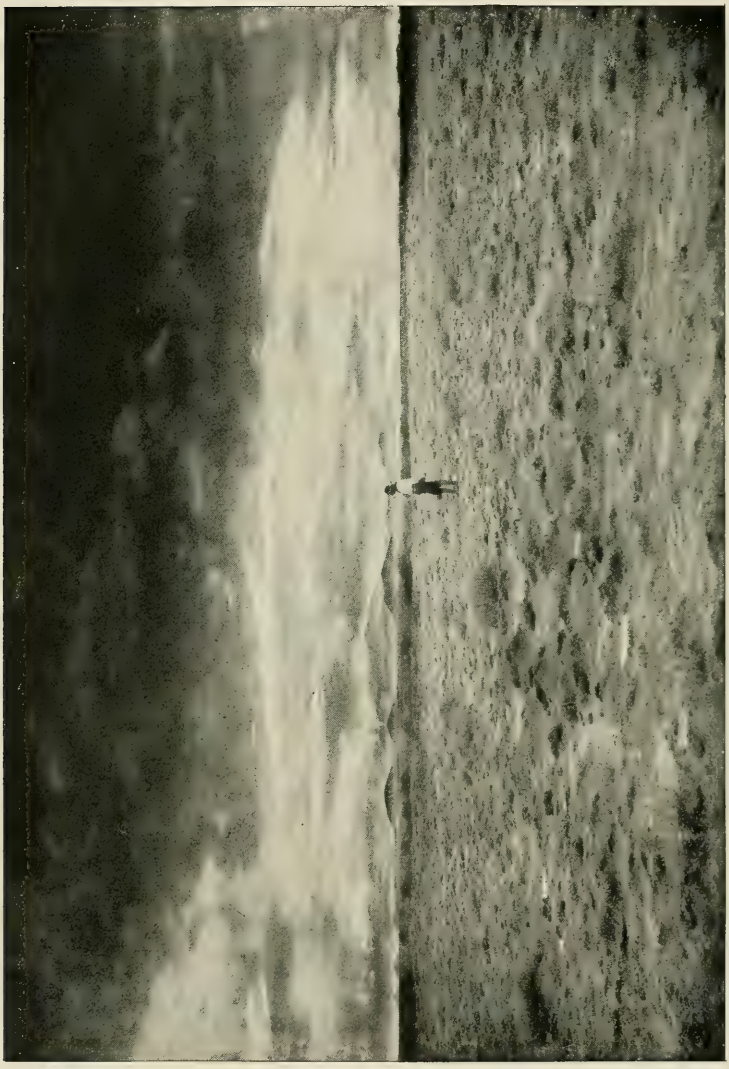
The work done in correcting existing maps is laudable, very few persons on a pleasure outing taking any care of the possibilities in this line.

To one interested in exploratory work there is much that holds him. There is practically no account of the geology of the region. Compared with the Swiss Alps, the authors say the climbs are easier, and

"Last, but by no means least, in the free, wild life of the backwoods can be

From "Central Asia and Tibet," by Dr Sven Hedin. Copyright, 1903, by Charles Scribner's Sons

A Sandstorm in the Desert



From "Indians of the Painted Desert Region," by George Wharton James. Copyright, 1903, by E. E. Farnsworth

In the Heart of the Painted Desert

found absolute freedom from all taint of the vulgar or commonplace; and the sense of mystery and awe at the unknown—things which are gone forever from the high mountain ranges of Europe—yet linger around the crest of the Northern Rockies."

The beautiful illustrations, of which there are a large number, give an excellent idea of the region.

ROBERT H. CHAPMAN.

Geographic Influences in American History. By Albert Perry Brigham. With 73 plates and 16 maps. 5 by 7½ inches. Pp. xiii + 366. Boston: Ginn and Company. 1903.

A story of our history as affected by our environment, charmingly told by a master who knows both aspects of his subject and who understands their relations one to the other. The character of the early immigration to these shores and of the men who formed the vanguard of the westward movements across the continent, the influence of topography, soil, and climate in determining the course of the streams of migration, and the settlement in the great interior valley and the Cordilleran region are sketched out with a bold, free hand in most delightful fashion. It is a fascinating story. H. G.

Indians of the Painted Desert Region. By George Wharton James. Illustrated. Pp. 264. Boston: Little, Brown & Co. 1903.

Mr James gives an exceedingly entertaining, and, on the whole, reliable account of the Hopis, Navahoes, Wallapais, and Havasupais.

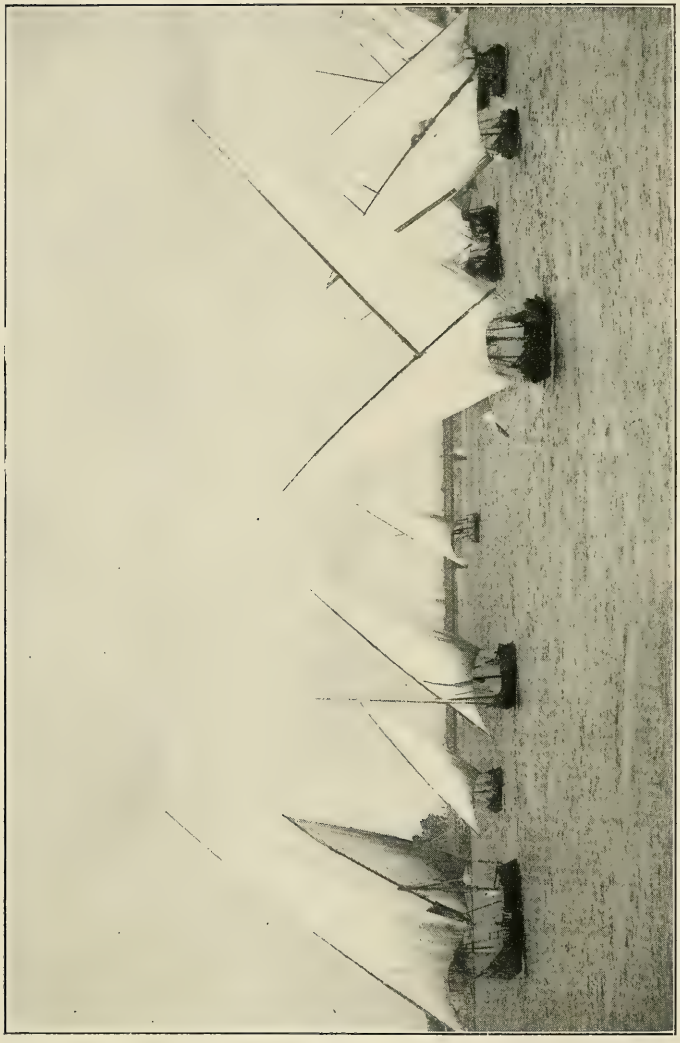
The Hopi houses are owned and built (in the main) by the women; the men weave the women's garments and knit their own stockings. "Here, too, the women enjoy other 'rights' that their white sisters have long fought for. The home life of the Hopis is based upon the rights of women. They own the houses; the wife receives her newly married husband into her home; the children belong to her clan, and have her clan name, and not that of the father; the corn, melons, squash, and other vegetables belong to her when once deposited in her house by the husband. She, indeed, is the queen of her own house; hence the Pueblo Indian woman occupies a social relationship different from that of most aborigines, in that she is on quite equal terms with her husband."

Commercial Geography. A book for high schools, commercial courses, and business colleges. By Jacques W. Redway. With 15 maps and many illustrations. Pp. 406. New York: Charles Scribner's Sons. 1903.

Mr Redway is well known, both as geographer and educator—a combination essential in the preparation of good school text-books. This book, however, is rather a disappointment, since the treatment of many of the topics is scanty and inadequate and in some cases incorrect. The book may be further characterized as a presentation of facts with little attempt to explain or correlate them. It is a compilation rather than a discussion. H. G.

Present-Day Egypt. By F. C. Penfield. Revised and enlarged edition. Illustrated. Pp. 391. New York: Century Co. 1903.

This volume was first published in 1899. It had already passed through several editions when Mr Penfield decided to revise and enlarge it, so that he might describe the enormous development of Egypt during the past four years. The great dam at Assûan, which forms a lake four times as large as Lake Geneva, and the no less wonderful works at Assiut are probably only the beginnings of a series of reservoirs which will extend at intervals along the Nile perhaps as far as Victoria Nyanza itself. The Assûan dam and the works now in construction will soon increase by 20 per cent the farm



From "Present Day Egypt," by F. C. Penfield. Copyright, 1903, by the Century Co.

On the Nile, above Cairo

land of the country. The water of the Nile is inexhaustible. Each work, however gigantic, soon pays for itself and then yields a handsome revenue each year thereafter. The volume is fascinating from cover to cover.

Meyers Historisch-Geographischer Kalender, 1904. Published by the Bibliographischer Instituts in Leipzig and Wien. New York: Lemcke & Buechner.

This calendar is not only all its title claims for it, but more—it is ethnologic as well. For each day in the year there is a separate detachable page, the upper half of which is devoted to a picture of an historic, geographic, or ethnologic subject, selected with good taste and judgment, many of them being half-tone reproductions of original photographs, one of which is especially noteworthy as a work of art, it being from a photograph by Alexander Alkier. It portrays the reflection of the "midnight sun" on the waters near Spitzbergen. A number of the pictures are reproductions of old historic wood cuts. Beneath the pictures are half a dozen or more lines of explanatory text. The lower half of the page contains a number of references to historic events which occurred on that date; this is followed by the date, the name of the month, day of the week, and the various feast days being also given. Below are the phases of the sun and moon, each month beginning with a planetary table. The work is unique in conception and execution and filled with a mine of information in concise form for the busy worker. J. H. Mc.

Report of the Smithsonian Institution, 1902. Profusely illustrated. Pp. lvi + 687. 6½ by 9 inches. Washington: Government Printing Office. 1903.

In the appendix of this useful annual volume are collected many papers of permanent value, giving a record of scientific progress in different lines. Most of them have been published elsewhere. Two of the papers are reprints of articles from the NATIONAL GEOGRAPHIC MAGAZINE—"Volcanic Eruptions on Martinique and St Vincent," by Prof. Israel C. Russell, and "Reindeer in Alaska," by Gilbert H. Grosvenor. Other articles of geographical nature are: "Progress of Geographical Knowledge," Col. Sir T. H. Holdich; "Wild Tribes of the Malay Peninsula," W. W. Skeat; "Pygmies of the Great Congo Forest," Sir Harry H. Johnston; "Guam and Its People," W. E. Safford; "The Nile Reservoir Dam at Assûan," Thomas H. Means; "Panama Route for a Ship Canal," William H. Burr; "Coral," Dr Louis Roule; "The Baoussé-Roussé Explorations, Study of a New Human Type by M. Verneau," Albert Gaudry.

Geology of Worcester, Mass. By Joseph H. Perry and Benjamin K. Emerson. Illustrated. Pp. xii + 166. 6 by 9 inches. Published by the Worcester Natural History Society. 1903.

This volume will prove a very useful guide to the people of central Massachusetts in their walks and drives. It is to be regretted that similar works do not exist of many other sections of the country.

Early Western Travels. 1748–1846.

The Arthur H. Clark Company, publishers, of Cleveland, Ohio, announce a series of Annotated Reprints of some of the best and rarest contemporary volumes of travel, descriptive of the aborigines and social and economic conditions in the Middle and Far West during the period of early American settlement.

The series is edited with historical, geographical, ethnological, and bibliographical notes, and introductions and index, by Reuben Gold Thwaites.

It contains facsimiles of the original title-pages, maps, portraits, views, etc.

31 volumes, large 8vo, cloth, uncut, gilt tops. Price, $4.00 net per volume (except the Maximilien Atlas, which is $15.00 net). The edition is limited to 750 complete sets, each numbered and signed; but in addition thereto, a limited number of the volumes will be sold separately.

Almost all of the rare originals are without indexes. In the present reprint series, this immense mass of historical data will be made accessible through one exhaustive analytical index, to occupy the concluding volume.

Irrigation Institutions. By Elwood Mead, C. E., M. S. Illustrated. Pp. xi + 392. —x— inches. New York: The Macmillan Co., 1903. $1.25 net.

The volume discusses the important economic and legal questions created by the growth of irrigated agriculture in the West. It is a timely work. Mr Mead is Chief of Irrigation Investigations of the Department of Agriculture, and for a number of years has had special charge of the examinations of the Department into the social and legal questions created by the use of streams in irrigation, both in this country and in other lands.

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Feb, 7 1913

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THE NATIONAL GEOGRAPHIC MAGAZINE

THE PHILIPPINE ISLANDS AND THEIR PEOPLE

By Henry Gannett,

Chief Geographer, U. S. Geological Survey, and Assistant Director of the Philippine Census

THE Philippine Islands are on the other side of the earth, 10,000 miles away. Lying near the equator, between 5° and 21° north latitude, the sun passes over them in April and May on its way north, and in July and August on the return journey, while in June the shadows are short and point to the south. It is always summer, always warm, and a minimum of clothing is constantly the fashion. The trade wind blows steadily from the northeast from November to May, and the monsoon from the southwest from June to October.

The islands are numbered by thousands, but no one knows how many there are, for the known number is constantly increasing as more accurate surveys of the coast are made. They range in size from Luzon, the largest and most populous, 41,000 square miles in area, and Mindanao nearly as large, down to the myriads of little rocks just above the water at high tide. The islands of Mindoro, Samar, Leyte, Bohol, Cebu, Negros, Panay, Paragua, and Masbate exceed 1,000 square miles in area each, and there are thirty-one which exceed 100 square miles each.

The shores of these islands are fringed with coral reefs which rise abruptly and irregularly from the depths of the sea, making navigation extremely difficult and dangerous. The charts prepared in Spanish times mainly by Spanish authorities are, as a rule, incorrect and often very misleading, so that it is necessary for shipmasters to use the utmost caution in approaching the coast or entering harbors. Our Coast Survey has been at work for the past three years, but although working as rapidly as possible, consistent with accuracy, it has as yet charted but few of the harbors. The magnitude of the work may be appreciated when it is understood that the coast of the Philippine Islands is much greater in extent than the entire coast of the main body of the United States, excluding Alaska, and that the coasts are much more intricate than our

own. At present no shipmaster thinks of entering a Philippine harbor, unless it be one with which he has familiarized himself, without carefully feeling his way by sounding.

Throughout northern and central Luzon runs a range of mountains parallel to the Pacific coast and closely bordering it, known as Sierra Madre. This range rises to heights of 4,000 to 5,000 feet, the highest portion being in the north. West of this is the broad valley of Cagayan River, one of the largest streams of the island, which flows northward, entering the sea at Aparri. This valley is the principal tobacco region of the Philippines, and is fairly well settled with about 200,000 people. For two-thirds of its length the river is navigable for small boats, which carry the products to Aparri.

West of this valley is a mountain system called Caraballos Occidentalis. This system consists of a main range with many subordinate spurs and branch ranges, on the east separating branches of the Cagayan River, and on the west running down to the coast, separating from one another the streams which flow directly into China Sea. Many peaks of this range exceed 6,000 feet in height, and a few are more than 7,000 feet. The spurs from this range come down closely to the coast, leaving only a narrow strip of cultivable land along the shore.

West of the Sierra Madre, in central Luzon, is a great depression or valley extending from Lingayan Gulf southward through Manila Bay and the Laguna de Bay to the highlands, separating Cavite province from Batangas. This valley has a length of nearly 150 miles, with an average breadth of at least 40 miles. Its floor is nearly level and throughout a large part of the area is raised but little above sea level. Much of it, especially near Manila Bay and Lingayan Gulf, consists of low alluvial lands but a few feet above tide, intersected by numerous bayous or estuaries. These regions are in fact delta plains formed by the Pampanga and Agno rivers. Manila Bay is a part of this depression, as is also the shallow Laguna de Bay, which nowhere has a depth exceeding 20 feet. Indeed, the Laguna de Bay is so shallow that at low water the steam launches which traverse it stir up the mud from its bottom almost constantly with their screws. This lake is drained by the River Pasig to Manila Bay.

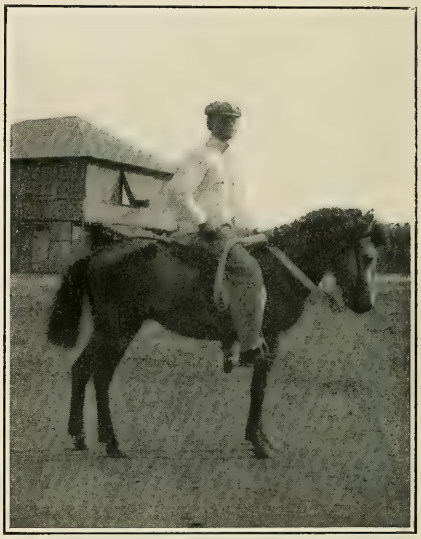


Photo by Gannett

An Ilocano Boy on One of the Small and Wiry Filipino Ponies

This great valley is the most densely settled part of the Philippines, containing nearly one-fourth of the civilized people of the islands.

West of this valley rises the Zambales Range, which, with the Mariveles peaks at the southern end, forms the backbone of the Zambalan Peninsula.

South of this great valley of central Luzon, in Batangas Province, is Lake Taal, which occupies the crater of an enormous extinct volcano, whose rim

TAGÁLOG GIRL SELLING MANGOES IN MANILA, LUZÓN.

Photo by Gannett

Boac, from the Walled Church

is strongly marked on all sides except on the southwest, where a small stream breaks through and drains the lake into China Sea. An active volcano rises as an island from the middle of the lake to the height of a thousand feet.

In the southern part of central Luzon are numerous volcanoes, most of them extinct. Southeastern Luzon has a very irregular outline and contains a number of short ranges and mountains of no great height. The greater elevations of this part of the island consist of active or extinct volcanoes. Of the former the most notable is the beautiful and symmetrical cone of Mayon, which rises from the shores of Albay Gulf to the height of 8,000 feet. This has been in eruption several times within the historic period and has done great damage to native towns and villages situated about its base. Another fine volcano, not now active, is Mount Isarog, which rises over 6,000 feet above the town of Nueva Caceras.

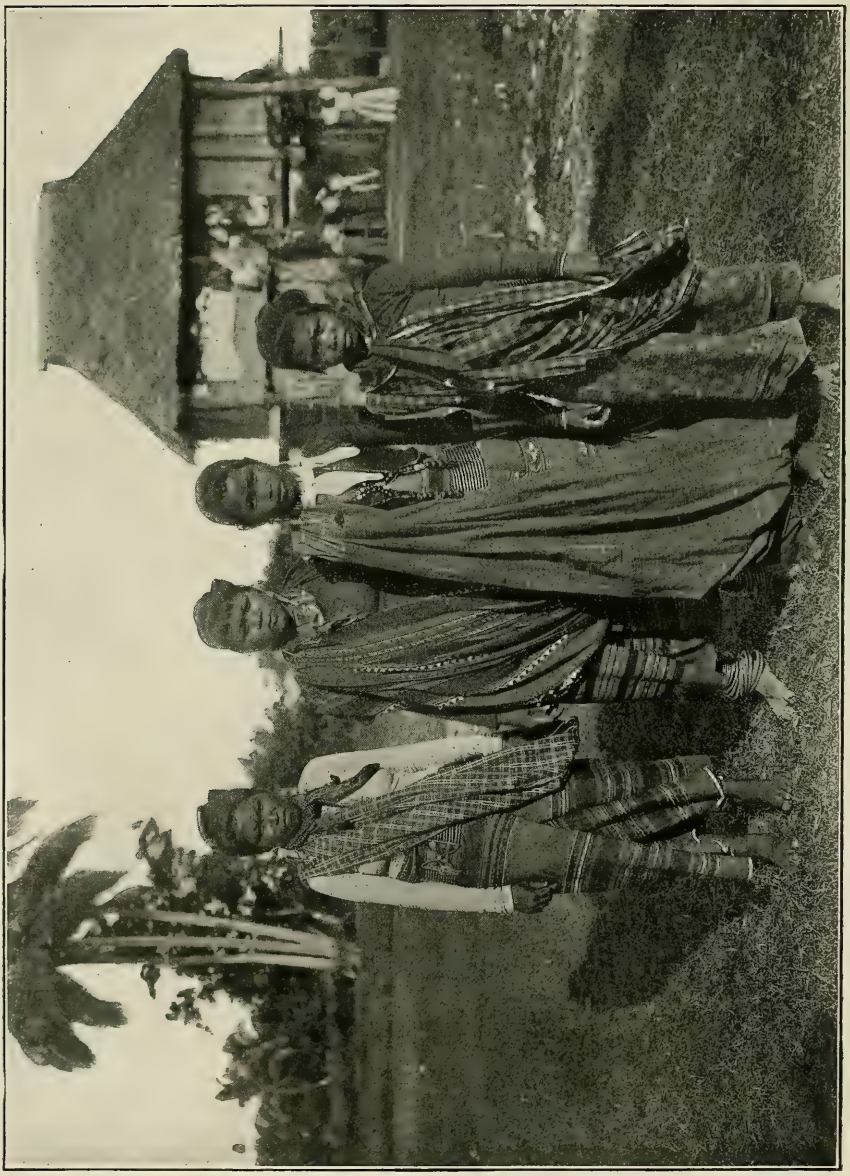
The island of Mindoro is little known except along the coast, as settlement has not penetrated the interior and few explorers have been far inland. It was crossed last spring at its widest part by Captain Offley, the governor of the province. The main topographic feature of the island is a range of mountains running from the northwest corner southeastward and then southward to the southern point, with broad spurs

Photo by Gannett

Igorrote Packers on the Road to Benguet

extending to the coast on either side. Its highest summit, Mount Halcon, has an altitude exceeding 8,000 feet.

The surface of Samar, the most eastern of the Visayan Islands, is exceedingly broken, but nowhere rises to a great elevation. Probably no summit of more than 2,000 feet in height is to be found on the island. The island of Leyte has a central range extending the length of the island from north to south, with a few summits exceeding 3,000 feet. Bohol, also of the Visayan group, is nowhere high, although most of the island is hilly. Cebu is characterized by a continuous range running from the northern to the southern end of the island, the greatest elevation, on the broadest part of the island, not exceeding 2,300 feet. The Island of Negros has a range running throughout its length, but without great elevation, excepting in the volcano Canlaon or Malaspina, which is said to have an altitude of more than 8,000 feet. Panay, the last of the large islands of the Visayan group, is dominated by a range of mountains extending from the northwest to the southwest point of the island, not far from the coast. This range, which furnishes the east boundary of the Province of Antique, has many summits exceeding 6,000 feet. From a point near the middle of this range there extends a subordinate range, which, running east and northeast, separates the provinces of Capiz and Iloilo.



TIRURAY DANCERS.

Photo by Gannett

Outskirts of Cotabato

The long, narrow island of Paragua has a mountain range extending its length from northeast to southwest, with peaks ranging from five to six thousand feet in altitude.

Of the great island of Mindanao most of the information we have comes from the explorations of the Jesuit fathers, who, in Spanish days, traversed it widely. It is known that along the Pacific coast of this island extends a range quite continuously from Bilan Point southward to Point San Agustin. West of this lies the broad valley of the Agusan River, peopled by a few Christians and many wild people. On the west side of this valley rises a succession of ranges trending nearly north and south, extending, with some breaks, down the west side to the Gulf of Davao, and separating it from the broad, fertile valley of the Cotabato River. This river heads north of the center of the island and flows, first, nearly south into a number of shallow lakes. These lakes outflow to the northwestward by a great river, still known as the Cotabato, which has built up a delta on the shores of Celebes Sea. Another range, trending northwest and southeast, separates this valley from the coast. In the interior of the island is a curious lake, Lanao. It has a length of twenty miles nearly north and south and an average breadth of ten or twelve miles. Its outlet is northwest to Iligan Bay. Its surface lies at an altitude above the sea of 2,200 feet, and the land rises abruptly from it on all sides to several hundred feet, that on the south being 800 feet above the surface of the water. Around this lake are grouped in villages 75,000 Moros, the largest and probably the densest settlement of these people in the archipelago. From this lake there runs, first westward and then southwestward, down the

peninsula of Zamboanga a range of mountains which terminates above the town of Zamboanga at the end of the peninsula.

These in brief are the leading topographic features of the larger islands. Summarizing, it may be said that the islands are almost everywhere mountainous and densely clothed in tropical vegetation. They are probably as beautiful islands as exist upon the globe, and

Photo by Gannett

An Igorrote

their possibilities under civilization and careful and intelligent cultivation are almost infinite.

THE CLIMATE

The temperature in the archipelago is at all times high, the mean annual temperature being throughout not far from 80° F., but, at least in the coast regions, is never excessive and is without any great variation during the year or during the day. It rises a few degrees only above the mean of the year in the spring and early summer months, and falls a few degrees lower than that average in the winter months. The annual succession of the temperature is pretty well shown by the thermometric record at Manila, where there is a range in the monthly mean temperatures of the year of only 7°—*i. e.*, from 77° in January to 84° in May. There is no extreme of heat. Temperatures of 100° are almost unknown, having occurred only twice in sixteen years, but for months the maximum temperature of the day may be above 90°. The lowest temperature on record is 60°, showing an extreme range in sixteen years of but 40°.

Now, to show what these figures mean, compare them with similar figures for the city of Washington. The highest temperature on record there is 104°, which is 4° above the highest in Manila. The lowest temperature ever suffered in Washington is —14°, not less than 74° lower than the lowest at Manila. The extreme range of temperature in Washington is 118° and in Manila 40°. The range of monthly mean temperatures in Washington is 46°—*i. e.*, the mean temperature of July is 46° higher than that of January, while in Manila the monthly mean range is only 7°.

There is no part of the year when clothing need be worn for protection against cold. White cotton suits are at all times in season, for the temperature is always above the perspiration point.

The diurnal range of temperature at points near the seacoast is slight, rarely exceeding 15°, while the average for the year is only 11°. The uniformity of temperature in the archipelago is, of course, due to its insular character, giving it a sea climate.

The relative humidity of the atmosphere is everywhere and at all times great, being commonly at least 75 per

TREE HOUSE OF THE GADDANES, NEAR ILAGAN, ISABELA, LUZÓN.

cent, while at certain seasons the air is practically saturated with moisture much of the time.

THE WINDS AND TYPHOONS

The wind system of the archipelago is simple. From November to June the trade wind blows continuously from easterly quarters. With the beginning of July the southwest monsoon begins and blows continuously until October, except as it may be interrupted by those storms known as typhoons, or, in the Tagalog language, "baguios." The monsoon is simply an annual land and sea breeze, produced by the change in the relative temperatures of the ocean and the land. In the winter, the sea being the warmer, the wind blows from the land, and thus here coincides with and reinforces the northeast trades. In the summer the land is hotter and the wind, setting toward it, forms the southwest monsoon.

Photo by Gannett

A Group of Pigmy Negritos with Two Americans of Average Size

Typhoons are whirling storms which commonly originate in the Pacific, east of the Philippines, and take a westward course, turning north and finally northeast and passing off into the north Pacific. Most of them cross the Philip-

pines on their westward course and turn north in the China Sea.

Their origin is probably in the region where the trade wind, blowing constantly from the eastward, meets the southwest monsoon. It may be by conflict between these two opposing air currents in this region that the whirl is set

ter, and violence the so-called West India hurricanes. They are of frequent occurrence, often following one another closely, at intervals of but a few days, and many of them have been very violent and destructive.

The rainfall of the archipelago closely follows the winds. The general *modus*

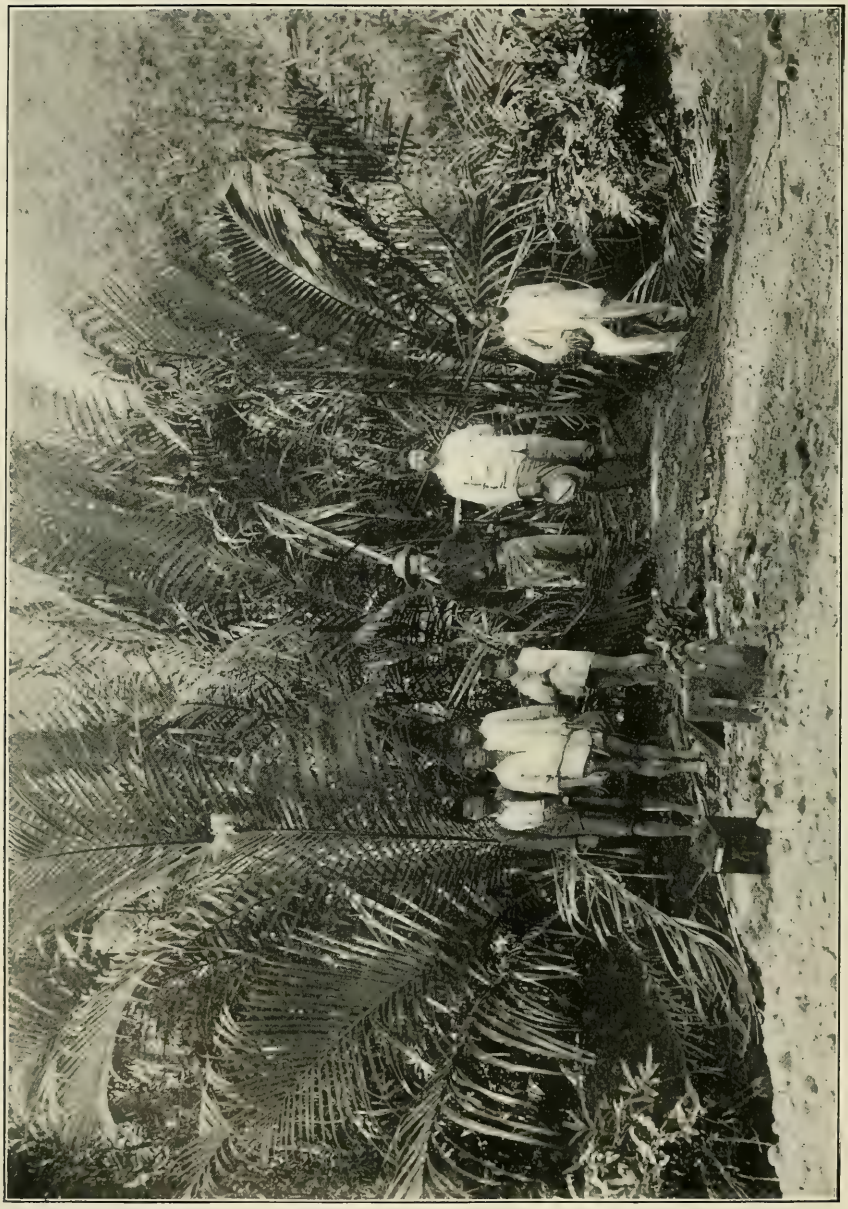
Photo by Gannett

Nipa House Under Construction

up. At first this whirl travels in the course of the trades, as they are the dominant wind, but as it goes westward the influence of the monsoon becomes relatively the stronger, and the typhoon yields to it and passes off in its direction to the northeast. Hence the monsoon season is the season of typhoons.

Typhoons resemble in course, charac-

operandi of rain-making is very simple and scarcely needs repetition here. Air coming off the sea is always and everywhere practically saturated with moisture. On reaching the land, if the latter is colder than the sea, and therefore colder than the air currents, which have the temperature of the sea, it is chilled, and hence, unable to hold in solution so-



NIPA PALM, FROM WHICH ROOFS AND SIDES OF HOUSES ARE MADE, CULION ISLAND.

much moisture, deposits a part of it as rain. This is especially the case if these air currents are forced up over mountain ranges, since in rising they are necessarily chilled.

The Philippine Islands are mountainous, and such air currents coming to them from any direction are forced upward to pass over the mountains into cooler regions. Hence there is a heavy precipitation on the windward side of the islands, while the leeward side, being under descending air currents already partly deprived of their moisture, receive little or no rain. The alternating winds of the Philippines, the trades and the monsoons, thus produce alternating wet and dry seasons.

On the east coasts of Luzon, Samar, and Mindanao, which face the Pacific, the winter and spring, when the trades prevail, is the rainy season. In most other parts of the archipelago it is the dry season. On the other hand, in the monsoon season, when the wind is from the southwest, the other, the westward-facing coasts, have a wet season, while the Pacific coasts are comparatively dry, or, at least, get much less rain. Thus at Manila there is practically no rain from November to June, while during the rest of the year the rainfall is heavy. There are places in southern Luzon and Samar where, owing to the fact that the islands are low, the air currents pass over them without losing much of their moisture, and hence carry it westward to be deposited elsewhere. Thus at localities in the Visayan Islands, west of these eastern coasts, the rainfall is abundant even in the winter season.

The total amount of rainfall ranges in different parts of the archipelago from 40 to more than 100 inches, the precipitation being greatest on the Pacific coast. At Manila it is about 60 inches, somewhat more than in the city of Washington, and of this four-fifths fall in the rainy season, between the first of July and the end of October. In these months rain falls nearly every day. The streets are flooded, the air is saturated with moisture, and things are covered with mould.

THE PEOPLE

All the larger islands are populated more or less fully, and mainly by little brown people of the Malay race. The only people not of Malay origin are the Chinese, Japanese, Americans, and Europeans, and the Negritos, the original inhabitants, who are found in small numbers in the mountains of the interior of Luzon and two or three other islands.

These brown people, both civilized and uncivilized, are separated into many tribes, and they are of all grades and degrees of civilization, ranging from cultivated gentlemen educated in the universities of Europe, to the wildest of head-hunters and the most timid of tree-dwellers. Among them, found almost entirely in the cities and mainly in Manila, are some three score thousand Chinese, and a small sprinkling of Japanese and East Indians. The Chinese carry on most of the business and do most of the hard manual labor of the cities. The ruling element of the whole consists of a small nucleus of some ten or twelve thousand Americans.

A classification of the natives by tribes is a rough index to the degree of civilization. The Tagalogs, occupying, in the main, central Luzon, are the most powerful and highly civilized; the Ilocanos in northwestern Luzon, the Bicols in the southern part of the same island, and the Visayans in the central islands of Samar, Leyte, Cebu, Bohol, and Panay, follow them closely in intelligence and civilization, as do also the smaller tribes of Pangasinan, Pampanga, Cagayan, and Zambales, in Luzon. These are the eight civilized tribes. Of these, the Visayans are far the most numerous, numbering over 3,000,000 and forming 45 per cent of all. Next

are the Tagalogs, who number 1,600,000, or 24 per cent, or nearly one-fourth. The Bicols form 8 per cent, the Ilocanos and Pangasinans 7 per cent each, the Pampangans 4 per cent, the Cagayanes 3 per cent, and the Zambalans only 1 per cent. These tribes live, in the main, on or near the coast or on navigable rivers. While not exactly a seafaring people, they spend much time upon the water, and a large proportion are fishermen. They travel mainly by boat, and the river transportation, by means of cascoes or large native cargo boats, is in their hands.

With the exception of the Moros, the wild tribes have been crowded back from the coast into the interior by the more civilized peoples, and are now found mainly in the mountains. The Moros occupy the coasts of southern Mindanao, and similarly have driven the wilder peoples into the interior of that great island. The Moros occupy also the whole of the Basilan, Jolo, Tapul, and Tawi-Tawi groups of islands.

Of the wild tribes the Igorrotes of the mountains of Luzon and the Moros of the southern islands are the largest and most powerful. Besides these, there are many smaller tribes, especially in Mindanao, who are even wilder. The lowest of all the people of the islands are the Negritos, who, though widely scattered over the archipelago, are found mainly in the mountains of northern Luzon, and number only 25,000. Of all these wild tribes, the Igorrotes are probably the most promising. Physically they are strong, sturdy mountaineers, and are bright, honest, and industrious. While many of them are still hunting heads in inter-village feuds in the remote region known as Bontoc, others are earning their livelihood as packers, miners, and farmers. All the baggage, furniture, and supplies of all kinds for the infantile mountain capital in Benguet province are packed on the backs of Igorrotes a distance of 25 miles and to an altitude of 5,000 feet. They number probably about 175,000.

The Moros are a very different people. They number about 275,000 and inhabit southern Mindanao and the Basilan, Jolo, Tapul, and Tawi-Tawi Island groups southwest of Mindanao. They are nominally Mohammedans, though their religion is not such as to interfere with their chosen modes of life. They were the Malay pirates of whom we read, who were the scourge of the Philippine coasts, raiding the towns, killing the men, and carrying off the women and children. Fierce and fearless in war, the Spaniards made little headway against them, and when Spain turned over the islands to us she left a prospective lot of trouble for us in this people; but by wisdom, patience, and a little sharp fighting we have established our supremacy, and there is peace in Moro land.

Each tribe has its own language, and even different parts of the same tribe may speak dialects which differ greatly from one another. Thus the Visayans of Cebu cannot easily communicate with the Visayans of Leyte or Samar; hence there is great confusion of tongues. Only a small proportion of the Filipino people use the Spanish language; indeed, less than 10 per cent. There are thousands of villages in which no one can be found who speaks Spanish. The Spanish spoken by the common people is by no means pure Castilian, but is commonly known in the islands as Caribao Spanish. English is taught in all the schools, and the younger generation is making rapid progress in it. Everywhere the Filipino shows a desire to learn the language and a great pride in the progress made.

This people numbers 7,600,000, scattered over 115,000 square miles, in 14,000 cities and villages. There are very few rural inhabitants. The people are gregarious, probably 99 out of every 100 living in cities or villages,

Carabao in Their Native Element

Photo by Gannett

MORO DANCING GIRLS.

around which are scattered their plots of cultivated ground. Such a scattered distribution of the farming population as is seen in the United States is almost unknown in these islands.

GOVERNMENT

The islands are organized into forty civil provinces, the city of Manila, and the semi-military, semi-civil province of Mindanao—forty-two in all. The civil provinces are divided into nearly one thousand pueblos, which resemble in certain ways our New England towns. These are in turn subdivided into nearly fourteen thousand barrios or villages.

The chief executive officer is the civil governor, who is aided by four Americans, who serve as executive heads of departments, with the title of secretary. These five, with three Filipinos, form the civil commission, which is the legislative body. Within these four departments are numerous bureaus, which, with two exceptions, have Americans at their heads. The judiciary is mainly composed of Americans, but contains several able Filipino judges.

The officers of the provinces are governors, most of whom are Filipinos, and treasurers and supervisors, all of whom are Americans, and secretaries, all of whom are Filipinos. The governor, treasurer, and supervisor of each province form the governing board, which decides all matters of importance concerning the province. The chief officers of the pueblos are the presidentes, all of whom are Filipinos. The presidentes of the pueblos and the governors of provinces are elected by the qualified voters. The civil governor has the right to suspend or remove any officer, whether elected or appointed, and to fill the vacancy thus created.

Throughout, in the general government, provincial government, and pueblo government, the minor offices and the clerical positions are in the main filled by Filipinos, who make excellent clerks.

The city of Manila is governed by a commission appointed by the civil governor, much as the District of Columbia is governed.

INDUSTRIES

Farming is carried on extensively, but by primitive methods and with primitive tools. The plows and harrows are of wood and are drawn by carabao .

The agricultural products are very numerous, but most of them are of little importance. The chief products are tobacco, which is grown mainly in northern Luzon, and especially in the valley of Cagayan River, in the northeastern part of that island; abaca, or Philippine hemp, a species of banana palm, grown in southern Luzon, the Visayan Islands, and northern Mindanao, or wherever the rain is well distributed throughout the year; sugar, produced in various parts of the islands, but principally on Negros and Panay; rice, raised everywhere, but not in sufficient quantity to supply the people ; cocoanuts, which are found everywhere near the coast ; cacao and coffee. Besides these, bananas and mangoes are produced in abundance and are excellent; oranges and lemons are very few, and these few are wretched travesties of the California fruit. Indeed, it seems strange that, with a soil and climate that will produce almost everything, vegetables and fruits are so few and so poor. Fortunes await American market gardeners in the suburbs of Manila.

In most parts of the islands the lands are subdivided to an enormous extent, and the cultivated tracts are very small. A few thousand square feet, the area of an ordinary city house lot, are sufficient to provide the Tao and his family with all that they require—a few bananas, a little rice, and camotes or sweet potatoes. Their wants are limited and easily supplied. Furthermore, nearly everybody owns his place, or at least claims to own it. There are, however, many people holding land as squatters.

The Filipinos are great fishermen, and most of their flesh diet consists of fish. For their capture they use both traps and nets.

The manufactures of the islands are mainly carried on by hand in the homes of the people. Thus are made on hand looms by the women the beautiful and delicate fabrics known as Sinamay, Jusi, and Pina. Thus are made the beautiful hats which one day may become as fashionable and highly prized as the well-known Panama hat. Most of the lumber is sawn by hand with whipsaws.

In Manila, however, are some large factories, especially of cigars. There are also several lumber mills, a brewery, and numerous other establishments.

MEANS OF TRAVEL

The transportation of the islands is mainly by steamers on the sea, coastwise, and by cascoes along the numerous short rivers and bayous. The traffic down the Pasig from the Laguna de Bay, that great lake in the interior of Luzon, surrounded by populous towns, is very great and is carried on these cargo boats. These are homes as well as cargo-carriers, for the boatmen live on them with their families. On the boats of all kinds in and about Manila about 16,000 people live constantly.

Travel among the islands is mostly by sea. There are several lines of native boats which carry passengers and freight between Manila and the provinces, and the civil government possesses a number of boats known as coast-guard boats, which it uses for transportation of mail and passengers and its own freight. These coast-guard boats are very comfortable, although their accommodations are limited. The native boats are, however, extremely disagreeable for white people, and are to be avoided if possible.

Travel in the interior is much more difficult. The only railroad in the islands runs northward from Manila to Dagupan, a distance of 120 miles. It is a narrow-gauge road, owned by an English company, and is run at the dizzying rate of 15 miles an hour for express trains, and all its appointments are in proportion. The native travel on this road is enormous and the freight movement is large.

A few good roads were built in the islands under Spanish régime, the longest of which runs from Dagupan northward along the coast to the north end of Luzon. Most of the bridges on this road are temporary affairs, built of bamboo, which go out with each wet season, and many of them have not in recent years been replaced. The road also, which originally was well constructed of macadam, is now badly washed in places. This is probably a sample of the condition of the best roads in the islands. Aside from a few such roads, the ways consist mostly of trails impassable to wheeled vehicles.

For passenger travel the common animal is the Filipino pony, which is a little larger than a Shetland pony, is rather stockily built, but well shaped and hardy, tough, free, and fast. They are used both for riding and driving and make excellent saddle animals.

The draft animal is the carabao, or water buffalo, much like an ox, with slow, ponderous movements, dark dun, almost black in color, the hide lightly covered with hair, and generally equipped with large, heavy horns. This animal is used not only in the country in all farming operations, but largely in the city for draft purposes. The weakness of the animal is his constitutional inability to go long without a bath, and when left to himself he is almost amphibious, spending a large part of his time in water. A few hours' work in the sun without a bath is often fatal. The carabao is a Filipino animal in the sense that it recognizes only the Filipino as its master. It distinguishes a white man by his odor, and in many cases is excited by his presence. If at

all viciously inclined, he is dangerous of approach, and instances have been known of his attacking and killing white men. He is to the Filipino what the mule is to the plantation negro. They understand one another and get on together excellently.

HOTELS AND HOUSES

The Philippine Islands are practically without hotels or any other public stopping place for travelers. True, there are hotels in Manila and in two or three provincial capitals, but elsewhere the traveler is obliged to throw himself upon the hospitality of the provincial officers, the presidente of a pueblo or the teniente of a barrio. If he hesitates to do this, he can quarter himself upon the constabulary, if there is a constabulary post, where he may find a cot upon which to spread his blankets, and probably will get a meal.

The houses of the Filipinos differ with their social condition and with the different tribes and in different parts of the islands, but they may be generally classified as those built of nipa, or its equivalent, and those of more durable material, such as wood, brick, or stone.

All the Filipino houses, wherever they are and whatever the material, are raised above the ground, generally to the height of a full story. The space beneath is commonly utilized as a stable for ponies or for a chicken house. The more durable houses are built of stone, brick, or wood, and are large and roomy, with plenty of window space. They are commonly entered from beneath by a broad, winding staircase, which lands the visitor in the middle of a large hall running the full length of the house. This hall is 20 feet or more in width and lighted by windows at the ends. One end of it is commonly the dining-room and the other the sitting-room, while on either side of it, and communicating with it by doors, are the bedrooms. The furniture is scanty and simple, consisting generally of a round table and easy, cane-seat chairs. The walls are double, the spaces between them forming galleries four or five feet in width, these galleries being entered through broad openings commonly curtained. In the outer wall are windows and blinds running independently of one another in grooves. The windows are very commonly glazed in small panes, three or four inches square, of shell instead of glass, which are sufficient to admit light, but nothing can be seen through them. At night everything is shut tight, windows and blinds, either from fear of night air or of spirits, which stalk abroad after sunset. The floors of these houses are generally made of the native hardwoods, are often very beautiful, and are a great source of pride to the possessor, who keeps them well oiled and waxed.

The roofs of this class of houses are of tiles, tin, or, among the poorer ones, of thatch, nipa, or cogan grass.

The houses classed as nipa are made of several different kinds of material, but in the main of bamboo and nipa palm. The frame, which is commonly very simple, is built of bamboo poles; the walls are made of a coarse mat woven of nipa, while the roof is thatched with the same material, nipa being a palm which is found abundantly in swampy places. Sometimes the sides, as well as the roof, are thatched with nipa instead of being made with this coarse mat. Where nipa can not be had, cogan, a coarse grass, is often used. The windows are mere openings, closed by shutters of nipa mat or of thatch. The floors are open work, made of strips of small bamboo tied down to the floor beams. Probably nine-tenths of the houses in the islands are of nipa, or some equivalent plant, built upon much the same plan as above. The erection of a nipa house is a very simple matter, requiring only a few days' labor and costing only one or two hundred dollars.

Some months ago a square half mile of the Tondo district of Manila, consisting almost entirely of nipa huts, was burned. A month later most of them were restored. The nipa house is entered, not by a stairway, but by a ladder from the outside. The rooms are commonly small and the people live very closely. The houses are, of course, only one story in height. Indeed, throughout the islands the buildings, as a rule, are low, most of the residences containing only one story, while business buildings rarely rise to more than three.

FOOD AND DRINK

In the Philippine Islands no white man drinks raw water—that is, unless he courts cholera or dysentery. Whenever possible he boils it or distills it, preferably the latter. In Manila is a large distilling plant, carried on by the government for the use of its civil employés. The natives are by no means as careful, and most of them drink the water as nature provides it and attempt to avert cholera by prayers and charms.

The native lives principally upon rice and fish, with a little fruit and vegetables. This low diet is by no means satisfactory to the Europeans and Americans in the islands, which do not produce at present the kinds of food which they demand; consequently the table of the American is supplied mostly with frozen meat, brought from Australia or the States, and with canned vegetables and fruits. Fresh milk, except from caribao, is practically unknown in the islands, there being only half a dozen milch cows in Manila, and the necessity is supplied by condensed milk and canned cream. The islands produce very few fruits which are palatable to Americans.

Since the Spanish times the prices of most commodities and the wages of most kinds of labor have doubled and trebled, not only in Manila, but in most parts of the Philippines, and rents, especially in Manila, have soared skyward. Houses which five years ago were rented for 25 pesos a month now cost two or three times as many dollars. A group of houses recently built of nipa, containing four rooms each, were rented long before their completion at the rate of $36 gold per month, the annual rent of the house amounting to more than twice the cost of the structure.

PHILIPPINE CURRENCY

Until recently the money in use in the islands was what is called Mex., the unit of which was the Mexican dollar or peso, which had varying values in gold, ranging from 40 to 50 cents. Heretofore, during American occupation, American money has been used to some extent, and the natives have thoroughly learned the distinction between the two and their relative values. Until the introduction of the Conant dollar, Mex. was the common medium of exchange, and a somewhat bulky and heavy one. A lady starting on a shopping expedition found it necessary to place in her carriage a bag full of pesos. Fifty or a hundred dollars in pesos, the equivalent of $20 or $40 gold, made about as heavy a load as she would care to carry from the carriage into the shop. Often upon returning from a shopping expedition she brought back less weight with her than she carried. Very little paper money was in use. One would occasionally receive bills on the Hongkong and Shanghai bank, or on a Filipino bank, but they were generally so filthy that the heavy silver was preferable. While the average Filipino is reputed to be somewhat light-fingered, few people even take the trouble to lock up their money, for it is commonly believed that Mex. is too nearly worthless to be stolen.

At the time of the introduction of the Conant dollar, American money was well known to the natives, not only in Manila, but throughout the islands generally. Even the newsboys and boot-

blacks knew the difference between Mex. and American money, and made change accordingly. An American dime bought two newspapers, while a Mexican ten-cent piece bought but one.

PRESENT PEACE IN THE ISLANDS

The question has been frequently asked, "Is the war in the Philippines over?" This would seem to indicate a great misapprehension concerning the situation in our Pacific islands. Many people seem to suppose that outside of a few garrisoned posts, it is dangerous for white people to travel about. Nothing could be farther from the truth. The fact is that in the portion of the islands inhabited by the civilized peoples—*i. e.*, three-fourths of their area at least—a white man is as safe in traveling or living as in Arizona or Colorado or Montana. He may go about with perfect freedom. Not only that, but the people are ready and anxious to show him hospitality. The Filipino from whom he asks a night's lodging feels highly honored and gives him of his best. The men salute him as he passes, and the children cry "Buenas dias," and are very proud if their salutation is returned. Among the wild people, the situation is much the same, although here it is better to send notice of one's coming in advance and to bear some sort of credentials. With these precautions, there is no more danger than in traveling on the reserve of a tribe of friendly Indians.

To illustrate the situation, the work of the provincial treasurers is instanced. Each of these (they are all Americans) is required by his business to visit every pueblo of his province, and such a trip may involve hundreds of miles of travel overland on horseback or by carromata. So far as known, no treasurer has ever been molested, although he often carries much money about him. The provincial supervisors, also Americans, are obliged to travel everywhere, as are many other civil officers of the government. At the present time, Americans are all over the islands on one errand or another, public or private. No one thinks of danger or provides against it beyond, perhaps, putting a revolver in his pocket.

There are ladrones still at large, but only a few, nearly all having been killed or are in prison serving long sentences, and the islands are now practically free from ladronism. Ladrones, or, as they were formerly called, tusilanes, are simply robbers. The Filipinos have always had them, and they were just as abundant and troublesome in the days of Spanish domination as they have been since the flag of Spain came down. They are often organized into gangs, and their common plan of operation is to shoot up a village at night, rob the houses, and perhaps hold some of the people for ransom. Their operations are always directed against their own people. They never interfere with Americans. The big, husky, efficient American soldier has taught even the worst of them that it won't pay. Two or three Americans have been killed in fights with ladrones, but not one, so far as known, has been intentionally interfered with.

Ladronism reached its maximum early last spring, when a dozen provinces, some of them near Manila, were infested with them. The native constabulary, with white officers, have been most efficient in chasing them down and breaking up their bands. The troops were not called out, as they were not needed. At present there are scarcely any ladrones left, only a few in Albay Province, in southern Luzon, where they have not been pursued with as much vigor as elsewhere, but recent advices indicate that the constabulary have since destroyed their bands.

The war has been over for more than two years. The people are pacified, quiet, and well disposed. They have

the utmost respect for Americans, a respect rapidly ripening into confidence and affection. This condition has come about in spite of famine, the loss of their farm animals through rinderpest and surra, and a severe epidemic of cholera.

WILL THE ISLANDS PAY?

Another question frequently asked is, "Will possession of the islands pay us?" In the first place, it is not a question which we should even ask ourselves. The question of profit in any form should not enter into the matter. When we took the islands from Spain we assumed a duty—that of reducing them to order and of maintaining them as good neighbors to the other peoples of the earth. We might have shirked the duty, we might have abandoned them to become a Venezuela or a Haiti, or we might have turned over the work of patrolling and protecting to some other nation, such as Germany, who was eager to exploit them, or to Great Britain, who might have been induced to accept the responsibility for them. If, however, we had been weak enough to have thus shirked our responsibility, I think that every one of us would have lost self-respect, as he certainly would have lost pride in his country. It is not, therefore, a question whether the islands will pay us or not, for no one should stop to consider whether it will pay him to do what is right.

But I think they will pay us in more ways than one, and in one way at least they are paying us already—that is, as just suggested, in self-respect and in national pride. We have unhesitatingly assumed our duties and are fulfilling them. We have reduced the people to order, and have put them under civil government. In our colonial administration we have accepted the best of the English methods—and they are far the best heretofore in use—and have improved upon them from the start in many ways; first of all, by giving this people as great a measure of self-government as they can carry on. Thus far our colonial administration, although our first attempt, and therefore somewhat experimental, has proven eminently successful, and it increases one's pride in his citizenship to note the manner in which we are carrying out this somewhat difficult work.

Even in the matter of dollars and cents it is probable that the islands will ultimately pay us; not that this is a matter of importance, for when a question of duty is involved, a great nation like ours can not afford to debate cost or profit, even if it be millions or hundreds of millions of dollars. When we see our people rapidly obtaining control of the commerce of the Pacific and find our government paper money, mere promises to pay, received as readily as gold in the Far East, in China, and in Japan, we can realize what our advent in the Philippines has done already and what it is leading to. Because of our possession of the Philippines we shall become the dominant power of the Pacific, both politically and commercially.

Japan and Korea, with the surrounding seas and the adjacent coastal region of China, is the subject of a large chart, 26 x 48 inches, just published by the U. S. Hydrographic Office. The chart gives the depths of water along the coasts and is a useful supplement to the land map published by the War Department and issued as a supplement to this number of the NATIONAL GEOGRAPHIC MAGAZINE. The chart may be purchased by sending forty cents to the U. S. Hydrographic Office, Washington, D. C.

RUSSIAN DEVELOPMENT OF MANCHURIA*

By Henry B. Miller, United States Consul to Niuchwang, Manchuria

ONE of the greatest achievements in city construction that the world has ever witnessed is now going on in the heart of Manchuria.

THE BUILDING OF HARBIN

In the building of such cities as Vladivostock, Dalny, and Port Arthur, Russia has demonstrated her power and purpose on the Pacific in line with the world's conception of her character; but in the construction of this wonderful city of Harbin she is displaying an altogether different type of activity from what we are prone to attribute to her.

It is in this city, more than in all the others combined, that Russia is asserting her intentions of becoming an active industrial force in the affairs of the Orient, and her people are already giving the place the title of the Moscow of Asia.

The city is located on the Sungari River, at the point where the Manchurian branch of the Siberian Railway crosses the stream and where the Chinese Eastern branch starts south to Dalny and Port Arthur. It is about 350 miles west of Vladivostock and 600 miles north of Port Arthur. Its location is the geographical center of Manchuria, and from present prospects it is to become the commercial center as well. The city is surrounded on all sides for hundreds of miles with a rich and productive agricultural country, producing corn, wheat, oats, barley, beans, millet, hemp, tobacco, vegetables, and some fruits. Minerals and timber and great areas of grazing lands also surround it.

At present the place consists of the old town, 3 miles from the central depot, Prestin or the river town, the present commercial center, and the administration town, in close proximity to the railway station. Before the railway engineers established this as their headquarters there was no native town in this vicinity, and the entire place is therefore a Russian product.

ADMINISTRATION

It is as distinctly a Russian city as though it were located in the heart of Russia, and none but Russians and Chinese are permitted to own land, construct buildings, or engage in any permanent enterprise. The city has been created by the Russian government, under the management of the Manchurian Railway Company. The land for many miles in each direction has been secured so as to make it impossible for any foreign influence to secure a profit or foothold close to the city, and foreigners are not recognized as having any rights whatever, but are permitted there by sufferance. The chief railway engineer is the administrator of the city, and up to the present time has had complete control of everything, but in the new scheme for the government of Manchuria some form of municipal organization will be permanently established.

In 1900 the place began to assume importance as a center of railway management, and in 1901 the population had grown to 12,000 Russians; in 1902, to 20,000; by May, 1903, to 44,000, and in October, 1903, a census showed a population of 60,000, exclusive of soldiers. Of these, 400 are Japanese

* The National Geographic Magazine is enabled to publish in full this excellent account of Russian progress in Manchuria up to the close of 1903, through the courtesy of Hon. O. P. Austin, chief of the Bureau of Statistics.

and 300 of all other nationalities, including Germans, Austrians, Greeks, and Turks. All the rest are Russians. There are no Americans.

The railway and administration employés, including families, constitute 11,000 of the population. The Chinese population is about 40,000, located in a special settlement. The ratio of women to men is as follows: Japanese, 120 per cent; Russians, 44 per cent; Chinese, 1.8 per cent; average of women, 14.3 per cent.

Harbin is the center of the entire railway administration of Manchuria, and, as the Russian commercial enterprises of the Far East are under the direction of the railway company, it will also be the center of Russian industrial and commercial development. It is the headquarters of the civil courts and the chief military post and the main center of control of all the vast army of railway guards. The administration city, therefore, consists of all of the public and private buildings and shops necessary for these various departments. Residences for the employés cover the largest area of this division of this marvelous city.

The following are some of the principal buildings of the administration city;

Building.	Cost of buildings.	
	Rubles.	*Dollars.*
Administration buildings, three stories in height, having a total floor space of 3,600 square sagene (176,400 square feet), to cost when finished	1,200,000	618,000
Railway shops	2,500,000	1,287,500
Hospitals	626,000	322,390
Commercial school and girls' school	500,000	257,500
Technical school	250,000	128,750
Eight schools for teaching Russians Chinese and for teaching Chinese Russian	96,000	49,440
Club and store for employés	370,000	190,550
Hotel	163,000	83,945
Russo-Chinese bank	200,000	103,000

The total administration expenditure on the city has been 30,000,000 rubles ($15,450,000).

TRANSPORTATION

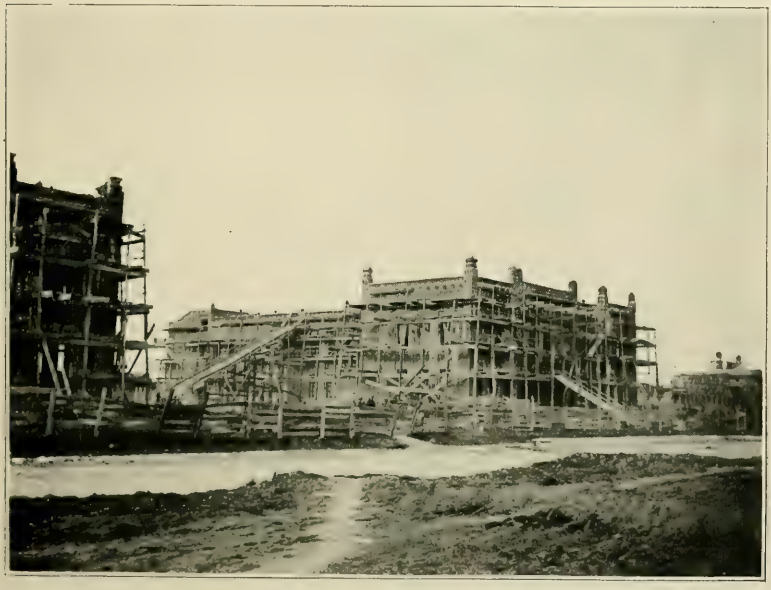
Steamers.—The Sungari River is navigable with light-draft steamers and native craft for nearly 200 miles above the city, up both branches of the river, and much traffic has already developed on these streams, especially in wheat.

From Harbin to the Amur River, during the navigating season, which begins in April and ends November 1, good-sized river steamers run daily. These steamers are well fitted with good, comfortable cabins for first, second, and third class passengers. They carry large cargoes of freight and usually tow barges loaded with freight. From Harbin to seagoing steamers at the mouth of the Amur cargo is carried now at 14 kopecks per pood, or about $4 gold per ton The Chinese Eastern Railroad Company and the Amur Steamship Company run good steamers on this line, and there are also several private boats covering the same route. All are loaded continually to their full capacity.

The steamers are mostly of the stern-wheel type, burning wood, such as are in operation on the western rivers in the United States, but as far as I could learn none are constructed of American-made machinery. The time usually required to go from Harbin to Kharborofsk, at the mouth of the Ussuri River, on the Amur, is five days. At this place these steamers connect with trains for Vladivostock.

Railroads.—Going west from Harbin the train takes you by a branch line from the crossing of the headwaters of the Amur to Stretensk, the head of navigation of this great river, while the main line goes to Lake Baikal (Siberia) and Russia. Going east, the railway reaches the sea at Vladivostock over a grade that does not exceed in any place 13 feet to 1,000. Going south, the Chinese Eastern Railway meets seagoing ships at Niuchwang, Dalny, and Port Arthur. The heaviest grade on this line is 9 feet

Administration Building, Harbin, October, 1903 (to cost 1,200,000 rubles, $618,000)



School of Commerce, Harbin, October, 1903. Woman's College on the Left

Russian Church, Harbin

View of Russo-Chinese Bank and Railroad Hotel in the Distance, Harbin, October, 1903

to 1,000, and that for only a short distance and at rare intervals.

In October, 1903, the regular number of trains dispatched for through traffic was thirty per day. Eighteen local trains were dispatched in addition. These local trains connected the two extremes of the town, viz., the old town and Prestin, with the administration part of the city.

There are also about 400 nesoshticks, or Russian carriages, for public use, and the average earnings of these vehicles is 5 rubles ($2.58) per day.

There is also an automobile line ready to start four machines to operate between the old town and the administration city; each vehicle will carry ten persons. These machines are now on the ground and will carry passengers for 20 kopecks (10 cents) each way. This line is in connection with an electric tramway that is to run a loop line through the river town, or Prestin, and a double loop, or figure 8, line throughout the administration town. This is a private corporation, with a capital of 250,000 rubles ($128,750). The same company is to provide an electric-light system for all three sections of the city.

DISPOSAL OF LAND

Harbin was started primarily as a military center and an administration town for the government and direction of railway affairs. Its growth into a splendid commercial and manufacturing city was not originally provided for by the promoters, and it has been somewhat of a surprise to them, but the fever of making it a great Russian commercial and manufacturing city has now taken possession of the railway management, and every system of promotion and protection that can be devised to increase its growth along these lines is being energetically encouraged.

The capital for most of the private enterprises is furnished by Siberian Jews. Chinese are furnishing money for the construction of some of the finest private buildings, such as hotels, store-rooms, etc. In the administration part of the city no private buildings of any kind are permitted.

The old town was the first to be laid out, and the land was sold to the public at the rate of 1 ruble (51.5 cents) per square sagene (49 square feet) the first year, but this rate is now increased to 3 rubles ($1.55) per square sagene. Following this, in 1901, the administration town was laid out and construction work began on buildings covering 20,000 square sagene (198,000 square feet). Later the river town Prestin was laid out, and in a very short time all of this was sold at a price of 17 rubles ($8.70) per square sagene, and most of it is now covered with substantial brick structures, there being 850 buildings, constructed at a cost of 8,000,000 rubles ($4,120,000). Recently two very large additions were laid out adjoining the administration town, and the land has been sold at prices ranging from 5 to 15 rubles ($2.57 to $7.73) per square sagene. This was purchased largely by speculators, and is being bought from them now at from 20 to 40 rubles ($10.30 to $20.60) per square sagene (49 square feet).

The administration has already received over 2,000,000 rubles ($1,030,000) for land sold to private parties. Many elegant residences and substantial structures are in course of construction in the additions adjacent to the administration town. A hotel and theater combined was built at a cost of 60,000 rubles ($30,900) and rented for 25,000 rubles ($12,875) per annum.

All of this land is secured on an eighty-six years' lease.

THE RUSSO-CHINESE BANK

This is the only banking institution in the place, and it has an elegant home in a structure of stone that has a steam-heating and electric-lighting plant of its

own. The building cost 200,000 rubles ($103,000). The business of the bank has increased 30 per cent during the past year, and its daily transactions, exclusive of railway and other government accounts, amount to 400,000 rubles ($206,000). The bank makes no loans on realty, but advances from one-third to one-half capital for current substantial business. It is inaugurating a very efficient and active system of credits to Chinese merchants purchasing Russian goods for sale in Manchuria. In some cases as much as 200,000 rubles ($103,000) have been given in letters of credt to Chinese for purchases in Russia.

These experiments are proving profitable and satisfactory. The largest success is reported in cotton goods. Many large orders are now being placed in this line and a substantial trade is being created. These goods are brought into Manchuria via Vladivostock free of duty. So far, sugar has been the only article purchased on which the Chinese have lost money.

This system of advancing credit to Chinese merchants for the purchase of Russian goods prevails now generally throughout Manchuria, and it is by this method and by imports free of duty and favored rates over the railway that Russian cotton goods are likely to capture the great trade of Manchuria that is now largely in the hands of American manufacturers.

The Russo-Chinese Bank is also very generous to Chinese and Russian merchants in encouraging the purchase and shipping out of native products, but it is exclusive in its methods and will not encourage foreigners.

INDUSTRIES OF HARBIN

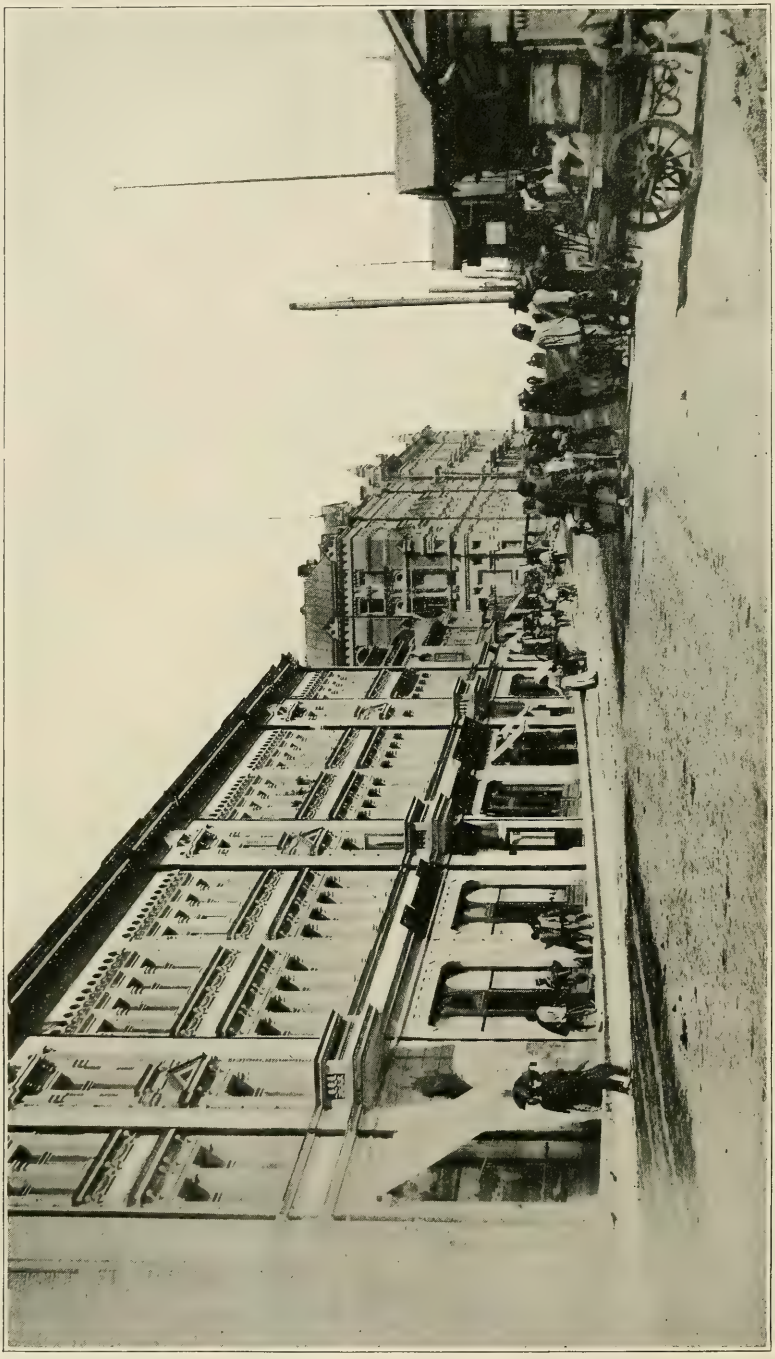
The leading industry of Harbin is the manufacture of flour. Eight mills are now in operation, all with modern European machinery with one exception, and that is a small one constructed with American machinery. Applications have been made and granted for the construction of two more large ones, and by the middle of 1904 10 mills will be in operation, producing 25,000 poods (902,800 pounds) of flour per day. They pay from 30 to 35 cents gold per bushel for their wheat delivered at the mills, and the wheat-producing area can be increased enormously. The present value of the flour mills in Harbin is 1,200,000 rubles ($618,000).

In the immediate vicinity of Harbin there are 200 brick-making plants, the cost of which was 500,000 rubles ($257,500). Two of these plants were constructed by the administration, at a cost of 200,000 rubles ($103,000). Most of the brick produced are used in the construction of the city. A very good grade of red brick is produced and sold for 6.50 rubles ($3.35) per 1,000. Most of the work is done by Chinese, who are paid 35 kopecks (18 cents) per day.

The next industry of importance is the production of the Russian liquor, vodka. There are eight manufactories, constructed at a cost of 200,000 rubles ($103,000). Several of these produce vodka from spirits of wine and sugar brought from Russia. Some produce only the spirits of wine from the local wheat, while others produce their spirits from local wheat and the vodka from their own manufacture of spirits. The consumption of vodka in Harbin alone is 1,000 vedro (2,707 gallons) per day, and the consumption throughout Manchuria is something enormous. In Russia the production is very heavily taxed, and it costs 10 rubles ($5.15) per vedro (2.707 gallons), while in Harbin it sells at from 1.50 to 2.50 rubles (77 cents to $1.28) per vedro. This is for 40 per cent alcohol. To make 1 vedro of 96 per cent of spirits of wine requires 82 pounds of wheat. The bottles for this vodka are at present brought from Japan, but at Imonia, in Manchuria, the Russians are now building a large bottle and glass factory.

River Sungari, Harbin—Russian Railway and Russian Steamer

Completed Section of Dalny, showing Residences of Railway Officials



Business Buildings in River Town, Harbin

Three breweries are now in course of construction in Harbin, to cost 200,000 rubles ($103,000). The Russians are great beer-drinkers and produce in Russia very good beer, but it is not of the quality that bears shipping long distances; hence very little Russian beer is to be seen on the Pacific coast or anywhere in Manchuria. At the present time American beer has the best of the Manchurian market, as 150,000 dozen bottles are imported through one firm at Port Arthur every year. A fine quality of barley is produced in the Sungari Valley, and these breweries will be able to buy it at about half the cost in the United States. There is little doubt but that the Russians will soon be producing all of the beer consumed in Manchuria. Our Pacific Coast hop men ought to be able to sell them their hops, however.

There are several companies engaged in this business, with plants costing altogether 250,000 rubles ($128,750). They cure hams, bacon, and all varieties of smoked meats and produce excellent articles. The hogs and cattle in this part of the country are grain-fed and make splendid meats, and the Russians are experts in preparing it for markets. So far these concerns have not been able to supply the Manchurian markets, but the cheap labor of the country, in combination with the cheap grain and the familiarity of the Chinese with hog-raising, makes a good foundation for the growth of the industry, and I can see no reason why it should not continue to grow sufficiently to produce all that may be required for the oriental markets.

There is a plant costing 25,000 rubles ($12,875) for the preparation of bean oil for use in painting.

Russians are especially fond of candies and sweets, and few people know how to produce a quality equal to the Russian product. There is a manufactory in this line in the old town costing 10,000 rubles ($5,150).

There is on the river a small sawmill that cost 15,000 rubles ($7,750) and two on the railway line between Harbin and Vladivostock that cost 150,000 rubles ($77,500).

AGRICULTURAL RICHES

There are many other industries in embryo, and, as the place is located in the center of an extremely rich agricultural country, has splendid transportation facilities, and is doing so well in the establishment of manufacturing, there is little doubt that it will increase at a very rapid rate as a manufacturing and commercial center.

The country is productive in wheat, cattle, sheep, hogs, millet, barley, oats, corn, beans, furs, hides, wool, bristles, bean oil, bean cake, hemp, tobacco, and timber, and has various undeveloped mineral resources; in fact, it has all the natural elements for the foundation of a great city.

RUSSIAN INVESTMENT IN MANCHURIA

The chief engineer who was in charge of the construction of the Russian railways in Manchuria informed me that Russia had expended in railways in Manchuria 270,000,000 rubles ($139,050,000). Add to this her investments in fortifications and in the constructions of the cities of Port Arthur, Dalny, Harbin, and other places, and it is a very moderate estimate to place her investments in permanent properties in Manchuria at a total of 500,000,000 rubles ($257,500,000).

AMERICAN VS. RUSSIAN TRADE IN MANCHURIA

What is the meaning to the United States of all this progress of Russia on the Pacific—the building of such cities as Harbin and the political domination of the country? It has been recently asserted by prominent people that it signified an enlargement of the market for our goods, and that of the present imports into Manchuria 75 per cent

were from the United States. General statements of this nature are easily made and easily believed, and without any careful examination into the details it has been the usual thing to assume that this development of Russia in Manchuria was certain to bring an increased market for the products of the United States. The subject has not yet been examined in all its phases as it should be, and as far as I know there is no one prepared by study and knowledge of all the details of the question to give a wise decision as to what the effect will be upon American trade from merely an economic point of view.

At the present time the principal imports from the United States into Manchuria stand in the following order: Cotton goods, kerosene, flour, lumber, canned and dried fruits and vegetables, beer, canned milk and butter, cigarettes, and sundries.

The exports from Manchuria to the United States are so small as to be a matter of no consequence.

Cotton Goods.—In cotton goods Russia is anxious for the trade, and is making every effort to secure the business and is becoming a serious competitor. Her advantages in this line are political, bank advances, and transportation. In a free contest, on purely economic lines, I think the United States can hold it. Russia favors the export of cotton goods into Persia by a heavy bounty, and just what she will do in order to secure this trade in Manchuria is not yet determined. At present she is providing a heavily-subsidized steamship line to bring these goods to Dalny and Vladivostock, where they enter free of duty, and no doubt they receive preferential railroad rates from these into the interior, or will if necessary.

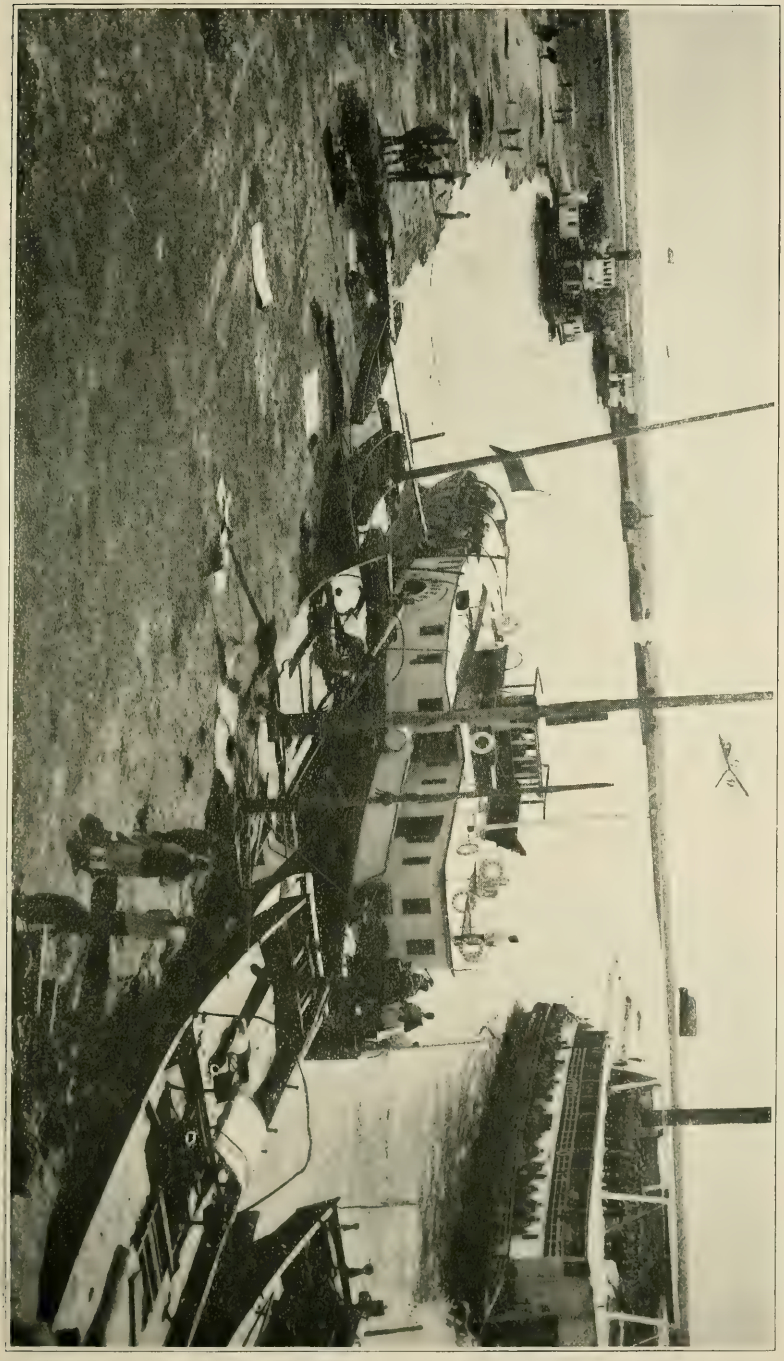
These things, together with the financial help of the Russo-Chinese Bank, have not yet been sufficient to do more than start the trade well, and they may have to resort to a bounty in addition, unless they can shut out foreign goods by a tariff.

The production of cotton goods in Russia is growing very fast, and, as they have their designs on securing the trade of Manchuria in this line, it is only reasonable to suppose that they will eventually secure the trade they are prepared to handle in any country over which they have control.

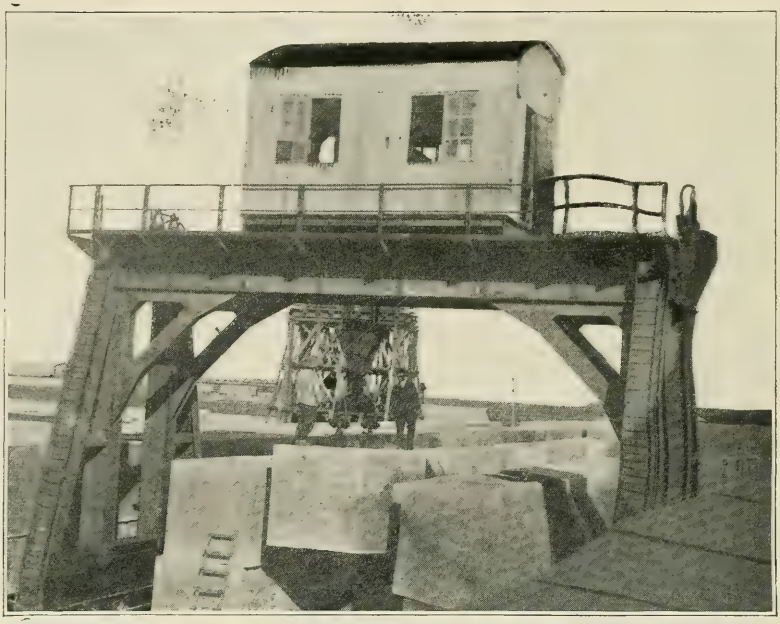
The following is from the pen of a well-known American writer, who has investigated the subject carefully and is thoroughly acquainted with the conditions of production and marketing of Russian cotton goods:

"There is considerable excitement just now about the Russian possession of Manchuria. * * * If Russia adopts the same methods as to other parts of Asia that she is now using in Persia she will drive all other countries out of the market. She has now the monopoly of the cotton business of Persia, and she has gotten it by giving a bounty to her manufacturers. On every pound of Russian cotton goods sent to Persia the Moscow exporter gets an allowance of 3 cents from the government. One cent covers the freight and he has 2 cents a pound profit, besides the usual profit on the goods. The English or German manufacturer has to pay full freight, with no rebate, and he can not compete. This same system will be adopted in China. * * * After the trade has been captured the rebate may be discontinued and the price will rise."

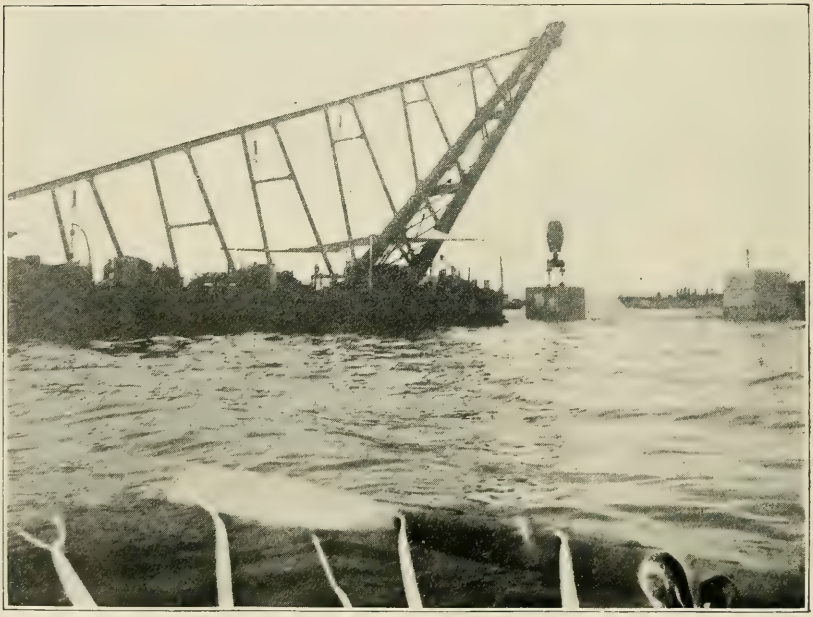
Kerosene.—This is the next in importance of American imports into Manchuria. Russian oil is already making very good headway in a free and equal competition with American oil. By forcing its use in all the cities of Manchuria, by special aid from the Russo-Chinese banks that are now established in all the principal cities, by preferential rates on the railway, by providing tank cars and tank stations along the railway line and refusing these advantages to American



River Sungari, Harbin



Handling the 50-ton Blocks for Construction of Piers, Dalny



Laying the 50-ton Blocks for the Piers, Dalny

oil, it appears to me that Russian oil will have an absolute monopoly of the trade if full control of the country is secured to Russia.

Flour and Lumber.—Concerning these products I have recently issued detailed reports, the summary of which indicates that the Russians have it in their power not only to capture our trade in Manchuria, but to become our most severe competitors in all the oriental markets.

Green and Dried Fruits and Canned Fruits and Vegetables.—In all of these lines I find United States trade expanding considerably, and from every point of view within my observation I am induced to believe that the trade will have a large and permanent growth without danger of disastrous competition.

Beer.—Our trade in this article meets with the competition of Japanese and German beer, but it has been growing continually and is now greater than ever before. When the several breweries in course of construction at Harbin are in operation our trade in this line is most likely to suffer, and in time may give way entirely to the Russian product.

Condensed Milk and Butter.—In butter, the Siberian article is already capturing the Manchurian market, as it is being handled by the commercial department of the Chinese Eastern Railway. It may become a very aggressive competitor for the entire market of the Orient. In condensed milk we have a large and growing market, not only in Manchuria, but throughout the Orient. Should the Russian government elect to engage in this business also, it has the advantage of very cheap milk in Siberia and one of the finest countries in the world in the valley of the Liao, together with cheap labor to establish the industry on a basis that would make it a great rival for our condensed-milk trade with Japan and China.

Cigarettes.—Russian cigarettes are already securing much of the trade and are now in greater evidence throughout the country than any other.

Sundries.—At Harbin an agent of a New York firm informed me that American trade there was confined now to canned goods, including fruits, vegetables, milk, etc., beer, sole leather, carts, and a few lines of hardware.

People informed me that they had succeeded in substituting Russian engines and railway material for American, and that the railway regulations now provided for the purchase of everything Russian when possible, and that had cut off much American trade. They also said that they were succeeding in driving out American kerosene, flour, lumber, cotton goods, and other things, and that they hoped soon to provide Manchuria with all the things that now come from the United States.

United States trade in Manchuria with the Chinese amounted to several millions of dollars per year and was almost entirely imports. It had grown very fast, and would have had an extended and most substantial increase without the Russian development, for the country was being improved and extensively developed, with a continual immigration from other provinces in China, before the railway construction began.

RUSSIA'S COMMERCIAL ADVANTAGES

A study of conditions in Vladivostock, Harbin, and other districts is not particularly encouraging to the idea of extension of American trade in Manchuria in any line that Russia is prepared to supply. A knowledge of the earnest intention of the Russo-Chinese Bank to press the sale of Russian goods, a slight insight into the methods and determination of Russian railways to find a market for the products of Russia, and the interest displayed in developing resources along their lines for Russians and Chinese only, taken in connection with the natural wealth and resources of the country, do not favor the hope that under a Russian régime our trade in Manchuria will be as large as it was before.

If we take into further consideration the fact that the Russian government—by subsidies and bounties and through its banks and railways—is engaging in industrial and commercial pursuits as a government, and calculate the cheap food, cheap and reliable labor, and the vast mineral resources that she will have at her command on the Pacific, the question of the Manchurian market becomes comparatively insignificant, and we find ourselves face to face with the greater problem of the markets of all Asia.

Constructing a Dry Dock at Dalny

Like the builders of the ancient pyramids, the Russians in Manchuria have no lack of laborers. They pay the Chinese laborers 30 cents a day in winter and 20 cents a day in summer.

With millions of cheap and efficient Chinese laborers, with vast coal fields bordering on the Pacific, with mountains of iron and copper, vast forests, and enormous areas of agricultural land, producing now the cheapest food in the world, what is to prevent Russia, if her apparent plans are realized, from becoming a dominating factor in the commercial development of the Far East? One can not view the marvelous growth of a city like Harbin or observe the cities of Vladivostock, Dalny, and Port Arthur and the great Siberian railway without pondering seriously the meaning of it all in the future of Russia on the Pacific.

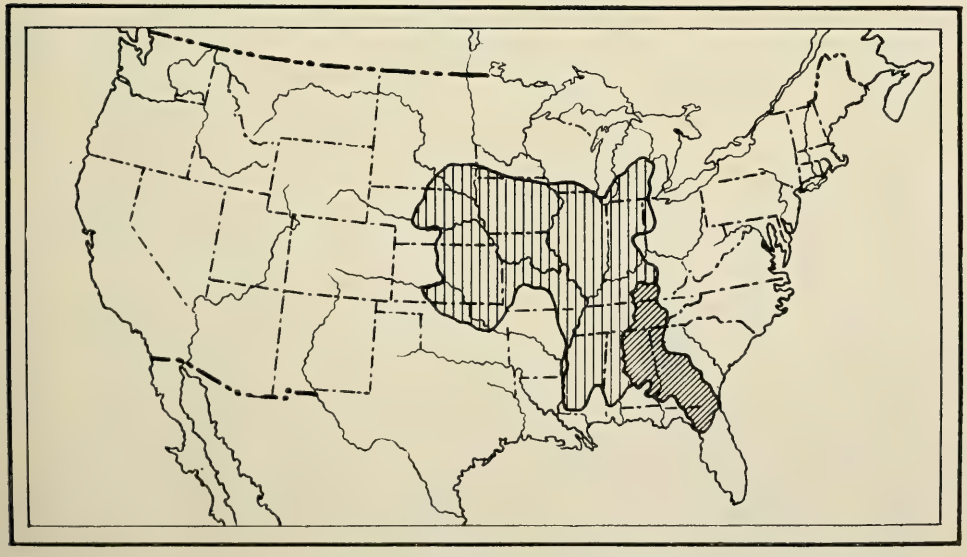
For the present, the prospect is that we shall at least meet with such unfavorable conditions in Manchuria as will endanger our present lines of trade. Whether or not this will be compensated for by an increase in other lines is not at this time clear.

There ought to be, and most likely will be, a large trade in agricultural implements. Of foreign countries, Germany is securing the most of this trade

now in Siberia and Manchuria, and there is no doubt whatever but that German trade is benefiting enormously by recent Russian domination of Manchuria. Next to the Germans come the Austrians, and next to them the Danish.

It is not in the least inspiring for an American to go through as busy and active a trade city as Harbin and find so few things from his country and not a single American citizen or progressive business house. The vision of 75 per cent of American imports into Manchuria dwindles to a most insignificant amount. When you see the great flour mills continually enlarging and increasing in number, when you see the numerous breweries being constructed, when you see Russian engines, and German, Austrian, and Danish machinery and products, and hear of the successful development of Russian lumber mills and the introduction of Russian cotton goods, and see in the Chinese stores Russian oil and cigarettes where before were American, and where you hunt with straining eyes to find something from the United States, one is not seriously impressed with the statement that, under Russian occupation, our imports into Manchuria are sure to increase.

Unfortunately, the only customs returns by which we can measure our trade year by year in Manchuria are from the port of Niuchwang, and even that is very imperfect, for the imports all come from Japan, Hongkong, and other Chinese ports, and the place of origin of the goods is not given in all cases. Goods are coming into Manchuria in great quantities through Port Arthur, Dalny, and Vladivostock continually, as well as through Niuchwang, but there is no means of securing a proper report of them.



Map showing Comparative Size of Manchuria and Korea and the United States

(See page 128)

MANCHURIA AND KOREA

THE magnificent war map of Manchuria and Korea, 36 by 42 inches, which is published as a Supplement to this number of the NATIONAL GEOGRAPHIC MAGAZINE, was prepared in the Military Information Division of the War Department from the latest explorations and surveys. Through the courtesy of the War Department, and in particular of Captain H. C. Hale, Acting Chief of the Division, the National Geographic Society is able to publish a large edition of the map. A key to the Supplement is published on the opposite page.

Manchuria corresponds in latitude to Manitoba, North Dakota, South Dakota, Minnesota, and Nebraska. Its area of 362,310 square miles is only 10,000 square miles less than the combined area of these great grain states. It is nearly three times greater than California, and is as big as Texas, Alabama, and Louisiana combined. Consul Miller in the preceding article describes the vast undeveloped resources of Manchuria. In the northern part of the province are thousands of square miles of rich wheat land entirely untouched. Manchuria has a possible wheat area as great as that of the United States.

Unlike China proper, Manchuria is not densely populated except in the south. The estimate of its population ranges from 10 to 20 millions. Korea is the same size as Kansas and slightly smaller than Minnesota, but, unlike Kansas and Minnesota, it is exceedingly mountainous. It has a population estimated at from 8,000,000 to 16,000,000, and its area is 80,000 square miles.

The mass of names given on the Supplement in Southern Manchuria, and especially in Korea, shows how densely populated are certain sections of these countries, and yet their density of population is not to be compared to that of Japan. Japan has a population of 45,000,000, increasing rapidly and living in a space no larger than the State of Montana; but only a part of her area of 150,000 square miles can be cultivated. The 45,000,000 Japanese are practically supported by what they can raise from an area one-third as large as the State of Illinois, less than 20,000 square miles.

The U. S. Consul at Vladivostok, writing just before the outbreak of the war, said:

"Owing to the low third-class rates, the traveling from western Europe to the Far East by the usual trains has become exceedingly cheap. The cost of transporting a third-class passenger from Hamburg to Shanghai by the Siberian and Manchurian railroads amounts to $51.50, inclusive of food, whereas the cost of a sea voyage is about $154.50. The German Government consequently has determined to transport German soldiers to the Far East and return by way of Siberia."

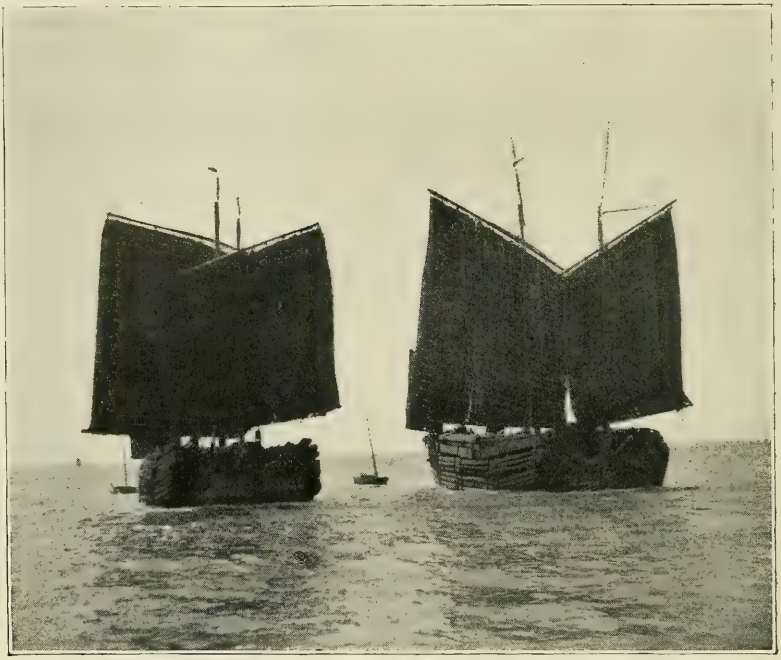
The following authorities may be read with profit at the present time:

"The Russian Advance." A. J. Beveridge. Harpers.
"The Yankees of the East." W. E. Curtis. Stone & Kimball.
"Handbook of Modern Japan." E. W. Clement. A. C. McClurg & Co.
"Korea." A. Hamilton. Scribner's.
"Korea and Her Neighbors." Mrs. I. L. Bishop. F. H. Revell Co.
"Manchuria: Its People, Resources, and Recent History." Hosie. London, 1901.
"China." J. H. Wilson. D. Appleton & Co.
"China—the Long-Lived Empire." E. R. Scidmore. Century Co.
"Village Life in China." A. H. Smith.
"Great Siberian Railway." M. M. Shoemaker. Putnam's.
"Guide to Great Siberian Railway." Ministry of Ways of Communication. St Petersburg.
"An American Engineer in China." W. B. Parsons. McClure, Phillips & Co.
"The Awakening of the East." P. Leroy-Beaulieu. McClure, Phillips & Co.
"The Mastery of the Pacific." Archibald Colquhoun. Macmillan Co.
"Problems of the Far East." Lord Curzon. Longmans Green & Co.
"American Diplomacy in the Orient." J.W. Foster. Houghton, Mifflin & Co.

Map of the Great Siberian Railway

Outline Map of Scene of Military Operations in the Far East

This map is designed to serve as a key to the large map which is published as a supplement. It shows the mountainous character of Korea and of the Yalu River country. Port Arthur is of the same latitude as Washington, D. C., and Kharbin a little more northerly than Portland, Maine. Scale, 250 miles to the inch.



Junks Bringing Timber to Niuchwang from the Yalu River

There are 25,000 of these junks trading at Niuchwang

Chinese Sawmill in Manchuria

LUMBERING IN MANCHURIA

THERE are many lumbering enterprises being established in Manchuria, Siberia, and Sakhalin, preparing to compete with the Pacific Coast lumber.

The most important is the Russian Timber and Mining Company of the Far East, with headquarters at Port Arthur. This company is organized by some of the most prominent men connected with the Russian government, and is reputed to have a capital of 20,000,000 rubles ($10,300,000). Its principal operations will be on the Yalu River, where it runs down timber from the forests of Korea as well as the large forests of Manchuria.

I have been informed by men who have seen these forests that they are very extensive and contain immense quantities of exceedingly fine timber. There is much fine timber in this market from that locality, and it has been the source of supply for both this and the Tientsin market for ages.

The ocean and river junks are built of this timber, hewn out in large pieces, often 3 feet and more in width. There are about 25,000 of these junks trading at this port (Niuchwang). The timber is mostly pine, very much like the white pine of the United States. This is the best quality of lumber that I have seen in China. The percentage of clear wood is not very large.

There is also considerable fir, usually much smaller than the pine, and also a timber similar to our tamarack. These are the three varieties from the Yalu district that I have seen. It is brought into this market and the other markets of China on junks. These junks, when coming to this market, usually sail in fleets as a means of protection against pirates, who often board them near the mouth of this river and rob them or levy tribute on them.

Most of this timber is driven or rafted down the Yalu in short lengths, and it is almost impossible to get long timbers from this district. The Chinese, in their native affairs, seldom use any but short timbers, and all the timber cut for Chinese consumption is cut into short lengths in the forests.

Up to the present the logs from this section have been cut into lumber by the whipsaw method, the natives using a thin and narrow saw blade with teeth set so as to cut both ways. Where the Russians have charge of the native sawmills they have introduced large and heavy saws, cutting only on the downward stroke—such saws as are used in our country for whipsawing lumber. With these the natives accomplish much more.

On the Yalu this old method is now to give way to another. Russia is to construct at the mouth of this river the third largest sawmill in the world. I have not been able to get the details or to ascertain whether the mill is to come from the United States or not, but it is certain that a great mill enterprise is already in process of construction. It is to be situated at one of the points of political controversy. It is at this place that the great naval battle between China and Japan was fought, the conclusion of which practically settled that war.

RUSSIAN LUMBER

In addition to this competition, which is already supplying large quantities of timber and lumber to Port Arthur, Dalny, and Niuchwang and to the Chinese Eastern Railway, the Russians are now shipping to all of these places by steamer from Vladivostock and vicinity and from the Island of Sakhalin large quantities of lumber.

This lumber, so far as I have seen it, is of a rather inferior quality compared with the Yalu lumber. It is harder, coarser grained, warps and twists badly,

and is difficult to work. Compared with the Yalu timber, it is about like the Norway pine compared with the white pine. It is, in fact, very much like the poor grade of Norway pine. What I have seen may not be the best quality, however. I am informed that the forests of Siberia and Sakhalin Island are quite extensive, and that the lumber production in that section is susceptible of great development.

This information I have from very reliable sources, but I can not write of it from personal observation. Mr Clarkson, formerly of Portland, Oregon, has a sawmill and sash and door factory at or near Vladivostock, and is reported to be having much success in this enterprise.

Another point of Russian competition in the lumber business is developing on the Sungari River, where the Chinese Eastern Railway crosses it, about 80 miles south of Harbin. Timber in considerable quantities is run down this river to this point and is being made into lumber by the Chinese method, several hundred men being engaged in the work. I am of the opinion that lumber from this source will never reach the sea in competition for the trade of China, but it will be a splendid source of supply for railway use and for the city of Harbin.

This timber, so far as I have been able to find out, is a fair grade of white pine, but the logs are all small. Whether this is due to the difficulties of driving on the stream or to the small growth in the forests, I have not been able to learn.

Harbin is today only three years old, but it is one of the greatest cities of Asia, and has the largest European population of any Asiatic city, containing 60,000 Russians, besides the soldiers. At Harbin there are two small sawmills cutting timber from the Sungari River, coming from below the city. On the railway line between Harbin and Vladivostock there are two large sawmills, the machinery for which cost, in place, 150,000 rubles ($77,250). These mills are engaged in cutting lumber at present for the railway and for the town of Harbin.

It is clear that Russia intends to provide for all the requirements of lumber in Manchuria and Siberia, with a possibility of entering the Chinese market.

The government has established a ruling that all railway and government supplies must be purchased from the Russian companies if possible. This is encouraging many industries in Manchuria, of which the lumber industry is one.

The recent purchase of considerable quantities of lumber from the United States was due to the haste in providing quarters for Russia's army in Manchuria.

The railway will require many ties, or sleepers, as these decay very fast, many having to be replaced before the railroad is completed. This is due to the fact that the railway is not yet ballasted, and the ties are laid deep in the earth and sand, not even the ends being exposed to the air. These ties are now coming in considerable quantities from Siberia and Japan, and I do not believe it possible for our country to compete for the trade.

The Russians are familiar with the lumber, wheat, and flour business, and as they have the natural advantages and the earnest support of their banks, railways, and government throughout Manchuria, I am convinced that their development of these industries is likely to soon close this market to our country in these products, and if they show intense energy and enterprise they will become severe competitors in the great markets of China for flour, especially, and possibly for lumber.

There is none of the lumber that I have yet seen equal to the Oregon pine, but much of it is good enough for the common markets of China and will be accepted for most purposes.

HENRY B. MILLER,
Niuchwang.

WEATHER PROVERBS

FROM earliest times to foretell the weather has had for all peoples of all degrees of culture an extreme fascination. The direction of the winds, the character of the clouds, the actions of insects and animals, etc., have served to foreshadow the coming weather. Every people and nearly every locality has its peculiar weather proverbs, many of which have been handed down for many generations. The modern science of meteorology has found that many of these ancient popular sayings are true enough, though many again are ridiculous. Prof. E. B. Garriott, of the U. S. Weather Bureau, has recently completed a careful selection of such weather proverbs as may be termed in the main correct for the United States, and the collection has been published by the Weather Bureau.* From this interesting collection the following sayings are taken :

Every wind has its weather.—*Bacon.*

When the wind is in the north,
The skillful fisher goes not forth ;
When the wind is in the east,
'Tis good for neither man nor beast ;
When the wind is in the south,
It blows the flies in the fish's mouth ;
When the wind is in the west,
There it is the very best.—*Isaak Walton.*

Clouds are the storm signals of the sky.

Rapid changes in the barometer indicate early and marked changes in the weather.

A sudden rise in the barometer is very nearly as dangerous as a sudden fall, because it shows the level is unsteady. In an ordinary gale the wind often blows hardest when the barometer is just beginning to rise, directly after having been very low.

When the glass falls low,
Prepare for a blow ;
When it rises high,
Let all your kites fly.—*Nautical.*

Men work better, eat more, and sleep sounder when the barometer is high.

Do business with men when the wind is from the westerly ; for then the barometer is high.

Sailors note the tightening of the cordage on ships as a sign of coming rain.

When rheumatic people complain of more than ordinary pains, it will probably rain.

When the perfume of flowers is unusually perceptible, rain may be expected.

Rainbow in morning, shepherds take warning;
Rainbow at night, shepherds delight.

Human hair (red) curls and kinks at the approach of a storm and restraightens after the storm.

Cats have the reputation of being weather-wise, an old notion that has given rise to a most extensive folklore. It is almost universally believed that good weather may be expected when the cat washes herself, but bad when she licks her coat against the grain, or washes her face over her ears, or sits with her tail to the fire.

All shepherds agree in saying that before a storm comes sheep become frisky, leap, and butt or "box" each other.

When the voices of blackbirds are unusually shrill, or when blackbirds sing much in the morning, rain will follow.

Robbins will perch on the topmost branches of trees and whistle when a storm is approaching.

A bee was never caught in a shower.

Expect stormy weather when ants travel in lines and fair weather when they scatter.

Ants are very busy, gnats bite, crickets are lively, spiders come out of their nests, and flies gather in houses just before rain.

When you see the ground covered with spider webs which are wet with dew and there is no dew on the ground, it is a sign of rain before night, for the spiders are putting up umbrellas ; but others say when the spiders put out their sunshades it will be a hot day.

Corn fodder dry and crisp indicates fair weather ; but damp and limp, rain. It is very sensitive to hygrometric changes.

Mushrooms and toadstools are numerous before rain.

The sun, moon, and stars indicate impending weather changes only so far as their appearance is affected by existing atmospheric conditions.

The moon and the weather
May change together ;
But change of the moon
Does not change the weather.
If we'd no moon at all,
And that may seem strange,
We still have the weather
That's subject to change.

When the moon rises red and appears large, with clouds, expect rain in twelve hours.

Excessive twinkling of stars indicates heavy dews, rain, or snow, or stormy weather in the near future.

A bad year comes in swimming.—*French.*

Frost year, good year. Snow year, good year.

A cow year, a sad year ; a bull year, a glad year.—*Dutch.*

Leap year was ne'er a good sheep year.—(*Scotland.*)

* Weather Folklore and Local Weather Signs. Bulletin No. 33. By E. B. Garriott, Professor of Meteorology. Prepared under the direction of Willis L. Moore, Chief U. S. Weather Bureau. Washington : Government Printing Office, 1903. $0.35.

The Russian Advance. By Albert J. Beveridge. With two maps. Pp. 486. 5½ by 8½ inches. New York: Harper Bros. 1903. $2.50 *net.*

Senator Beveridge made an extended journey through Manchuria and the Far East in 1901, preceded by a visit to Russia and Siberia. The present volume describes the impressions he derived on that journey, as well as the results of special studies he has made for a number of years of the Russian people and Russian history. His book is one of unusual power and foresight and is written in the characteristic eloquent and graphic style of the statesman author. He is a great admirer of Russian statesmanship, that "far-sighted and patient policy which has always looked ahead and considered the needs of the Russian people a century beyond the immediate moment."

The present war is the inevitable conflict of the Japanese conception of the Oriental "destiny" of Japan and the Russian conception of the Oriental "destiny" of Russia. But it is a conflict "not only of opposing interests, but of singularly acute race antipathies. Tolerant as the Russians are of other races, their hatred of the Japanese is pronounced and apparently instinctive."

Mr Beveridge tried to discover whether the Chinese in Manchuria objected to Russian control. The unanimous reply of every Chinaman, of high or low degree, seemed to be as follows: "I don't care who governs us, and I don't know a single Chinese merchant who does care. All we want is an opportunity to do business and make money." Though it was only a year after the Boxer outbreaks when Mr Beveridge was in Manchuria, he found peace and quiet everywhere. Hundreds of thousands of Chinese laborers were working on the railroad, on the new towns of Dalny, Harbin, etc., contented and happy. The secret of Russian success in bringing tranquillity so quickly is the Russian method. "It is the simple and traditional method of Russia to strike when you strike, and to spare not when you are striking. It is to wage war while war exists, and to employ the methods of peace only when war is over."

Russia waged no "milk-and-water" war in Manchuria in 1900; she waged a war of blood. But as soon as the fighting ended her soldiers stacked their guns and bayonets and started building cities and railroads. They employed thousands of Chinese laborers, paid them good wages, and kept them busy. Another cause of Russian success is the entire lack of race prejudice of the Russian. Superior to all the world, as he believes himself, he shows no offensive manner toward the other races with which he mingles; he fraternizes with the Chinaman, instead of rubbing in his superiority.

The volume deals almost entirely with the Russian advance in eastern Asia during the past few years. The closing chapters, however, discuss Russian capital and labor, the Russian workingman, priest, people, and church, Russian national ideals, the Russian common school and country hospital. There is a notable chapter on three Russians of world fame—Tolstoi, Witte, and Pobyedonostseff, procurator of the Holy Synod. Tolstoi is a noble by birth and a peasant by choice; Witte and Pobyedonostseff of the common people by birth, but of the autocracy by virtue of their very natures.

Witte has made Russia the largest owner and operator of railways in the world, the largest dealer in alcoholic liquors in the world, and soon will make her the greatest buyer and seller of tea. Should this process of giving the national government monopoly of the great industries continue, Russia will develop into a communistic state. It is said that the profits from the sale of vodka practically support the army and navy. Senator Beveridge states that the government control of the liquor business has

greatly reduced drunkenness and given the people a better and purer liquor.

"Russia is no state; Russia is a world," is the voice of the soul of Russia—"Russia that ever waits; Russia that is ever patient; Russia that ever advances; Russia that never hurries; Russia that looks upon other peoples as disorganized communities and dying races and considers herself the heir of all the ages."

The two maps given are unfortunate, both being very incorrect. The map showing Russian advances in Asia represents entire Russian expansion east of the Urals as having taken place since 1648, whereas the Russian had already reached Bering Sea at that time. The statements of advance on the east coast of the Caspian, and also south of the Amur, are also much displaced in time.

The U. S. Geological Survey has adopted a design for a Survey flag. The design is shown in the accompanying diagram, the triangle, cross-hammers, and stars being white on a blue background. The flag will be flown hereafter from all Survey camps at all times. The flag was designed by Mr Robert H. Chapman, of the Survey.

A map of the Republic of Panama, 23 by 42 inches, has been published by the Military Information Division of the War Department. The map is in colors and shows in detail all that is at present known of the territory of the Republic. A large and excellent map of the Panama Canal, with explanatory text, has been published by E. J. Beverstock, of Washington, D. C.

A Map Showing Commander Peary's recent discoveries in north Greenland and Grant Land has been published by the U. S. Hydrographic Office. It is in four colors, 30 by 34 inches, and is very beautifully engraved. The price of the map is 50 cents and it may be obtained from the Hydrographic Office.

"Diplomatic and Consular Service of the United States, with maps showing location and Classification of Consular Officers of each Grand Division of the World," is the title of an exceedingly useful report by the Bureau of Statistics of the Department of Commerce and Labor.

BOOKS RECEIVED

The Philippine Islands. 1493–1898. Volume IX. 1593–1597. By Emma H. Blair and James A. Robertson. Pp. 329. 6½ by 9½ inches. Cleveland: The Arthur H. Clark Company. 1904.

New Physical Geography. By Ralph S. Tarr. With many plates and diagrams. Pp. x + 457. 5½ by 7½ inches. New York: The Macmillan Company. 1903. $1.00.

Longmans' School Geography. By George G. Chisholm and C. H. Leete. Illustrated by plates and diagrams. Pp. xii + 513. 5½ by 7¼ inches. New York: Longmans, Green & Co. 1903.

Turkish Life in Town and Country. By Lucy M. J. Garnett. Illustrated. Pp. viii + 336. 5 by 7½ inches. New York: G. P. Putnam's Sons. 1904.

Madiaeval England. By Mary Bateson. Illustrated. Pp. xxvii + 448. 5½ by 8 inches. New York: G. P. Putnam's Sons. 1904.

La Japon d'aujourd'hui. By G. Wenlersse. Pp. 359. 4½ by 7½ inches. Paris: Librairie Armand Colin. 1904.

PLACE NAMES IN EASTERN ASIA

THE breaking out of the war between Russia and Japan is bringing trouble to every household in the land, for the place names of Korea and Manchuria are spelled differently by different newspapers and on different maps. These names in the native tongue are written in characters different from those which we employ, and have been transliterated into roman characters by different persons in different ways; hence the widely varying forms which are seen. It is not generally known that a system of transliteration of such names has been adopted by most European nations, by Canada, and by this country—a system which is simple, easy of application, and which, if generally followed, reduces these variations of spelling to a minimum. This plan is published in the report of the U. S. Board on Geographic Names, and is here republished for ready reference.

RULES FOR TRANSLITERATION

a has the sound of *a* in father.
e has the sound of *e* in men.
i has the sound of *i* in ravine or of *ee* in beet.
o has the sound of *o* in mote.
u has the sound of *oo* in boot.
ai has the sound of *i* in ice.
au has the sound of *ow* in how.
ao is slightly different from above.
ei has the sound of the two Italian vowels, but is frequently slurred over, when it is scarcely distinguishable from *ey* in the English they.

c is always soft and has nearly the sound of *s*. Hard *c* is given by *k*.

ch is always soft, as in church.

f as in English; *ph* should not be used for this sound.

g is always hard. (Soft *g* is given by *j*.)

h is always pronounced when inserted.

j as in English; *dj* should never be put in for this sound.

k as in English; it should always be used for hard *c*.

kh has the sound of the oriental guttural.

gh is another guttural, as in the Turkish.

ng has two slightly different sounds, as in finger, singer.

q should never be employed; *qu* is given by *kw*.

y is always a consonant, as in yard, and should not be used for the vowel *i*.

The U. S. Board on Geographic Names has passed upon only a few of these names of eastern Asia. Among them are Amur, Chemulpo, Korea, Seoul, Manchuria, and Tokyo. Of the names already in common use in connection with the seat of war, the following forms should be employed in accordance with the rules above quoted: Mukden, Yalu, Sungari, Chefu, and Fusan. H. G.

NATIONAL GEOGRAPHIC SOCIETY

8 p. m., Friday, February 26.—National Rifles Armory. "Travels in Arabia and Along the Persian Gulf." Mr David G. Fairchild. Illustrated.

4.40 p. m., Saturday, February 27.—Columbian University. "The Argentine Republic." Mr Charles M. Pepper.

8 p. m., Friday, March 4.—Cosmos Club. "The Work of the National Bureau of Standards." Dr G. M. Stratton.

4.40 p. m., Saturday, March 5.—Columbian University. "San Domingo." Mr Percy King. Illustrated.

8 p. m., Friday, March 11.—National Rifles Armory. "Little Known Peoples of Mexico." Dr Carl Lumholtz. Illustrated.

4.40 p. m., Saturday, March 12.—Columbian University. "Brazil."

8 p. m., Friday, March 18.—Hubbard Memorial Hall. "The Work of the U. S. Biological Survey." Dr C. Hart Merriam.

4.40 p. m., Saturday, March 19.—Columbian University. "Peru." Hon. Manuel Alvarez Calderon, E. E. and M. P. from Peru. Illustrated.

8 p. m., Friday, March 25.—National Rifles Armory. "The Louisiana Purchase Exposition." President D. R. Francis. Illustrated.

4.40 p. m., Saturday, March 26.—Columbian University. "Chile."

8 p. m., Friday, April 1.—Hubbard Memorial Hall. "A Journey Across Mindanao." Alonzo H. Stewart. Illustrated.

4.40 p. m., Saturday, April 2.—Columbian University. "Colombia and Venezuela." Hon. F. B. Loomis, Assistant Secretary of State.

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Photo by Fairchild

Boats Used at Bagdad

The boats are perfectly round, and are built of wicker work covered with native asphalt. They are the same type of boat that has been used in this region for 3,000 years. The boatmen skuil the boat with a broad, single-bladed paddle

Vol. XV, No. 4 WASHINGTON April, 1904

THE NATIONAL GEOGRAPHIC MAGAZINE

TRAVELS IN ARABIA AND ALONG THE PERSIAN GULF

By David G. Fairchild

Agricultural Explorer of the U. S. Department of Agriculture

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WILL the hanging gardens of Babylon be rebuilt and Chaldea be re-created? are questions which the American public seldom thinks about; and yet such an experienced engineer of irrigation as Sir Wm. Willcocks, of Egypt, declares, after examining the accounts of the old irrigating canals of the land of Babylon, that the day is coming when this great region that was at one time one of the wealthiest in the world, but which today is little but a waste of desert, may some day be rebuilt and become, as Egypt is rapidly becoming, a wealthy agricultural country.

It was with the object of having this land of Babylon investigated and of securing for the American date garden of Arizona the best varieties of Persian and Arabian date plants that Mr Barbour Lathrop, of Chicago, sent the writer, as his agricultural explorer, on a trip to Bagdad. The region is noted as the largest date-growing region in the world, and probably ten millions would not be an exaggerated estimate of the number of majestic date palms that are scattered from the mouth of the Persian Gulf to beyond the region of Bagdad.

While the principal attention of an agricultural explorer must be given to the gathering of information regarding the plants of a region, the general political problems can not fail to impress him. Especially do such questions force themselves upon his attention in a region like that of the Persian Gulf, which, in the minds of the residents themselves, it is believed will have an interesting and possibly eventful future.

The trip from Bombay to Busra, which was taken on the *Pemba*, a steamer of fifteen hundred tons burden, required thirteen days, including the various stops along the Persian and Arabian coasts. These short stops give one a glimpse of the wastes of desert land, of the interesting types of Arabs and their modes of life, and allow one time to converse briefly with a few European officials and date merchants who spend their lives in this out-of-the-way part of the world. The Per-

sian Gulf is a body of water almost as long as Lakes Huron and Michigan together, and is noted for its low shelving beaches, the frequency and severity of its storms, and its intolerable summer heat. The only part of the year in which life in this region is at all comfortable is the winter season—from the first of December to the middle of April. During these months the climate resembles that of the desert regions of California or the winter climate of Egypt.

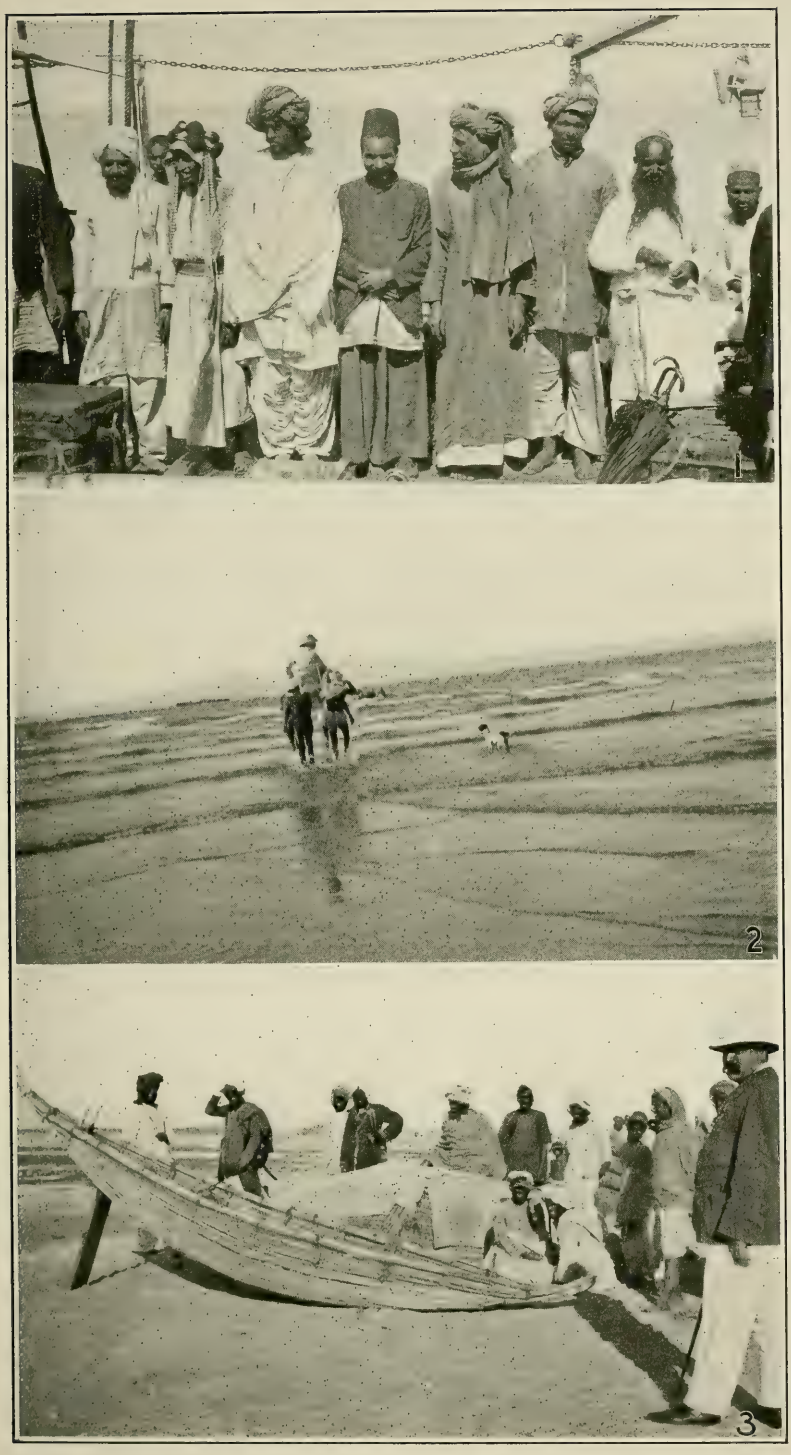
Photo by Fairchild

The House of a Wealthy Date Merchant

The family sleep on the high verandahs at night; at midday they withdraw to the inmost recess and close every opening by which the hot air can filter in.

During the winter season large numbers of Mohammedan pilgrims, coming from different provinces in India and different points in Persia, crowd the between-decks of the steamers with an interesting mixture of Oriental-looking baggage and picturesquely clad people. One realizes before the first night out that he is in the land of the "Arabian Nights". The old patriarchs who have made this pilgrimage to the Mecca of the Shia Mohammedans at Kerbela, near Bagdad, gather around them groups of younger, inexperienced pilgrims, and in Oriental cadences recite to them the thrilling story of the battle between the Prophet's grandsons at Kerbela. The wailing of the women and the sobbing of the men make one realize the religious fervor of these believers in the Prophet, and until the officers of the vessel inform you that it is the fashion to shed tears over this drama, no matter how many times it is repeated, you are inclined to attribute altogether too much sincerity to the emotion of these circles of listening pilgrims.

The first important port of call of the steamer is that of Muscat, nominally owned by the Sultan, but really a protectorate of England. As the boat casts anchor in the little harbor, surrounded on all sides by the rocky coast, the captain and chief engineer describe the discomforts of the summer season in this region. The shade temperatures, although no higher than in portions of this country during the daytime, surpass them by many degrees at night. A temperature of 110° at 4 o'clock in the morning, which is that recorded in Muscat, is not infrequent, and the few Europeans who are doomed to live there succeed in making life bearable by means of specially constructed fanning machines, which blow the air through wetted screens of grass roots. Muscat is one of the great shipping points for large quantities of dates, which are sent each autumn to the American markets. A few interesting bazaars, many strange types of costumes, and bits of old Arabian architecture make a short stay there interesting. The women of Muscat wear the most curious forms of mask that are to be seen in the Orient. They are richly embroidered squares of silk and wool, which cover the upper part of the face and leave the chin exposed, and in this respect they differ decidedly



Photos by Fairchild

1. A group of Mohammedans on a pilgrimage to Berbela.
2. Returning to the steamer at Jask.
3. As there are no trees and hence no wood on the shores of the Persian Gulf, the boats are made of the mid ribs of the leaves of the date palm. Such a boat is really a raft, it being impossible to keep out the water.

Photos by Fairchild

1. Three Brahmins on the "Pemba." As their religion permits them to eat nothing cooked by non-Brahmin hands, these men ate apart from the several hundred Mohammedan pilgrims on the steamer.
2. The boat shown in No. 3 of the preceding page in the water.
3. Mohammedan women at Bagdad.
4. The falcon of an Arab skeik.

from the ordinary masks seen in Egypt and Algiers.

The next stop of the steamer was the little more than open roadstead of Jask, which has no further significance than that it is the station for the Persian-European Cable Company, and that through this station are passing at the present time a large portion of the cablegrams from the Orient. A visit to one of these out-of-the-world telegraph stations makes one realize how many men there are who are willing to bury themselves for a petty salary in a region where there are absolutely no trees or green things in sight except the few that are planted and carefully watered by hand, when they might be living lives of comfort elsewhere.

Nearly opposite Task lies the harbor of Bander Abbas, regarding which it is probable we will hear much more should Russia attempt, as it is hinted she intends doing, to make of this port a naval harbor. Wigham has pointed out, in his interesting book on this part of the world, that the harbor of Bander Abbas can be made into a first-class naval harbor, and this opinion seems to be shared by the captains of merchant vessels who for years have passed up and down the Gulf. Whichever power secures this harbor is believed by the European residents to hold the key of the Gulf. While a short stop there and a call upon the British consular agent were not sufficient to give the writer anything but the most superficial view of the situation, such a view would support the standpoint taken by Wigham in his work on the region.

Crossing the Gulf, a short stop was made at the pearl islands of Bahrein, from which such quantities of valuable pearls are shipped every year. These islands form a gateway to the interesting region of El Hasa, which has been so little modified by the rapid developments of other parts of the world that there is in use today, in the markets of El-Hofuf, a small coin worth a fraction of a penny originating in the 6th century, called the "toweela," and shaped like a short, bent piece of telegraph wire, upon which is stamped the Cufic characters of one of the Carmathian princes. As an agricultural explorer, I was disappointed not to be able to visit El Hasa for the reason that the most noted date of the Persian Gulf region, the so-called Khalass of Hassa, is cultivated in the plantations around the town of El-Hofuf.

Bushire, the next point touched, is the Persian Gulf port for Shiraz, but the heavy weather, which often makes landing difficult at most of these ports along the Gulf, prevented more than a few hours' visit to this comparatively uninteresting Persian town.

It would seem hard enough to the traveler to undergo the discomforts of a long voyage on an old-fashioned steamer of small tonnage in order to visit Mesopotamia, but the Turkish government demands, in addition, ten days quarantine at Busra, and, to any one who has seen the inside of a Turkish lazarette, seven days of imprisonment in such quarters might easily deter him from making the trip.

Busra, on the Shat-el-Arab, is surrounded by great date forests, which stretch for 70 miles up and down this great river. It is made up of the town lying on the river, in which the handful of Europeans live who carry on the date shipping business, and the old town of Busra itself, some distance inland, but connected with the river by the old Busra Canal. It has been called the Venice of the Orient because of its numerous canals, on which, in long, slender boats like gondolas, the inhabitants move from place to place. These boats, or *bellums*, are poled along by picturesquely clad natives, who, in their way, in quickness and skillfulness, resemble the gondoliers of Venice. The gay colors of these boats and their men, the bright cano-

Photo by Fairchild

A Canal Scene—Busra

pies, the orchards of date palms, the adobe houses with their latticed windows, and the boatloads of peculiar produce make this old Busra canal a most interesting sight. The few Europeans who live in Busra manage in the summer season to keep fairly cool by spending as many of the hours of daylight as possible in the darkened lower quarters of the Arab dwellings in which they live, and at night they make themselves comfortable on the roofs of the houses. A social club, with its outfit of tennis courts, seems to be the only amusement possible to those unfortunate enough to be obliged to live in this out-of-the-world place. The principal business is that of date shipping, and in the autumn season shipload after shipload of the fruit of the surrounding palm trees is dispatched to New York, if possible in time for the Thanksgiving market.

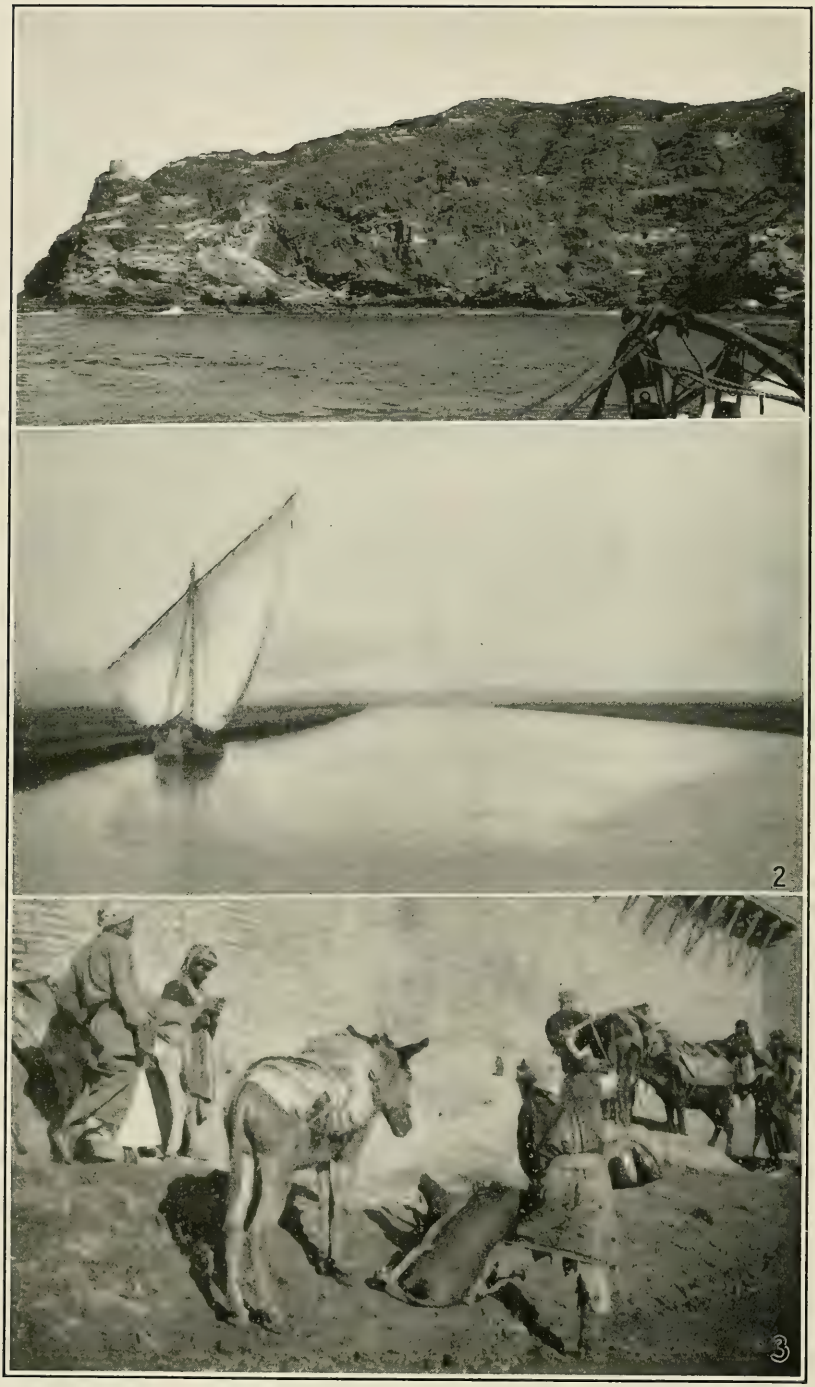
There are only two steamers plying up and down the historic Tigris, and possibly these might not be in existence were it not for the fact that the British government, at the close of the Crimean war, secured from Turkey the right to maintain three gunboats on the Tigris. One of these still remains and is to be seen opposite the British consulate in Bagdad. The other two have, with the consent of the Sultan, been replaced by side-wheel freight and passenger boats similar to those on the Mississippi, which are controlled by Lynch Brothers, of London, who make a handsome profit out of their almost complete monopoly of the Tigris River trade. Five days are necessary, with the best of success, to stem the strong spring current of the river from Busra to Bagdad. Its long reaches, sharp turns, and shifting sand banks make it a difficult river to navigate, and we had the experience, which is not unusual, of being turned completely around in our course by the strong current, against which for hours the feeble engine of the steamer made absolutely no headway. Although I had

Photo by Fairchild

In the Suburbs of Bagdad, showing the Mud Houses and Date Palms

heard much of this apparently almost level plain of Mesopotamia, five days' journey through it could not but convince me of its vast extent. Stretching on all sides to the horizon was the almost treeless desert only a few feet above the level of the river. The soil, though variable with regard to the amount of alkali it contains, is as fine as the Nile silt, and not a stone or rock as large as a man's fist was seen. It is from this adobe clay that the Babylonians made the remarkable bricks upon which have been handed down to us in the cuneiform language the records of butcher and tailor bills of six thousand years ago. Running almost parallel, but not in sight of the river itself, are the ruins of the ancient Nahrwan canal, which recent investigations have shown irrigated at one time immense areas of this now desert waste. Sir Wm. Willcocks has shown that the destruction of this canal by the Tigris, in its gradually changing course across the delta, was perhaps the most potent factor in the downfall of the land of Babylon, and it is interesting to read his estimates, from the standpoint of his long Egyptian experience, of the necessary expenditure to rebuild and extend this old canal and bring under cultivation millions of acres of unutilized rich river silt.

Bagdad is so connected with the story of the "Arabian Nights" that even though its tumble-down houses and narrow streets would be disappointing in the extreme to any one looking for the Oriental splendor of those days of Haroun-al-Raschid, it is nevertheless so filled with curious sights and is so unaffected by the civilization of Europe that it can not fail to appeal to one in search of novel sensations. Its mosques,



Photos by Fairchild

1. The harbor of Muscat.

2. On the Tigris in early morning. The river winds through many miles of treeless desert (Mesopotamia), which hundreds of years ago was populous and prosperous. Two million acres of fertile soil could be easily reclaimed by a canal system.

3. The skin water bag of the traveler in the interior.

with their gilded or tiled domes, and its bazaars, with their mixture of silks, weapons, and embroideries; its thousands of dogs, which, like those of Constantinople, are a feature of the place, and, above all, the gay costumes of the Christian women, make a stay in Bagdad extremely interesting.

There is a small colony of Europeans in the place, which is composed of various nationalities, and life is made bearable by a club, tennis court, and golf links. The latter are possibly the most unique links in the world, being upon the buried mounds of former villages. Under the mounds over which the golfers play lie buried, near the surface even, the skeletons and funereal jars of former generations, and it is not an uncommon thing for the golf player to strike with his golf club the shin-bone or vertebra of some half-decayed skeleton.

Many questions were under discussion by the European population of Bagdad during my short stay there, but naturally that relating to the new railway, which has been projected from Aleppo to Bagdad and as far as the Gulf, was one of the most important. The view most prevalent—at least the view presented to me—was a pessimistic one. The people acquainted with the sparsely inhabited region through which the railway must necessarily run for hundreds of miles, predicted that it would be impossible for such a railway to pay, and it was repeatedly pointed out that this great region would require for its development not only the building of canals, but the importation of large numbers of settlers, either from India or from other portions of Arabia, and their colonization along the line of the railway. What such a railway could

Photo by Fairchild

Women Filling Their Water Jugs in the Tigris—Bagdad.

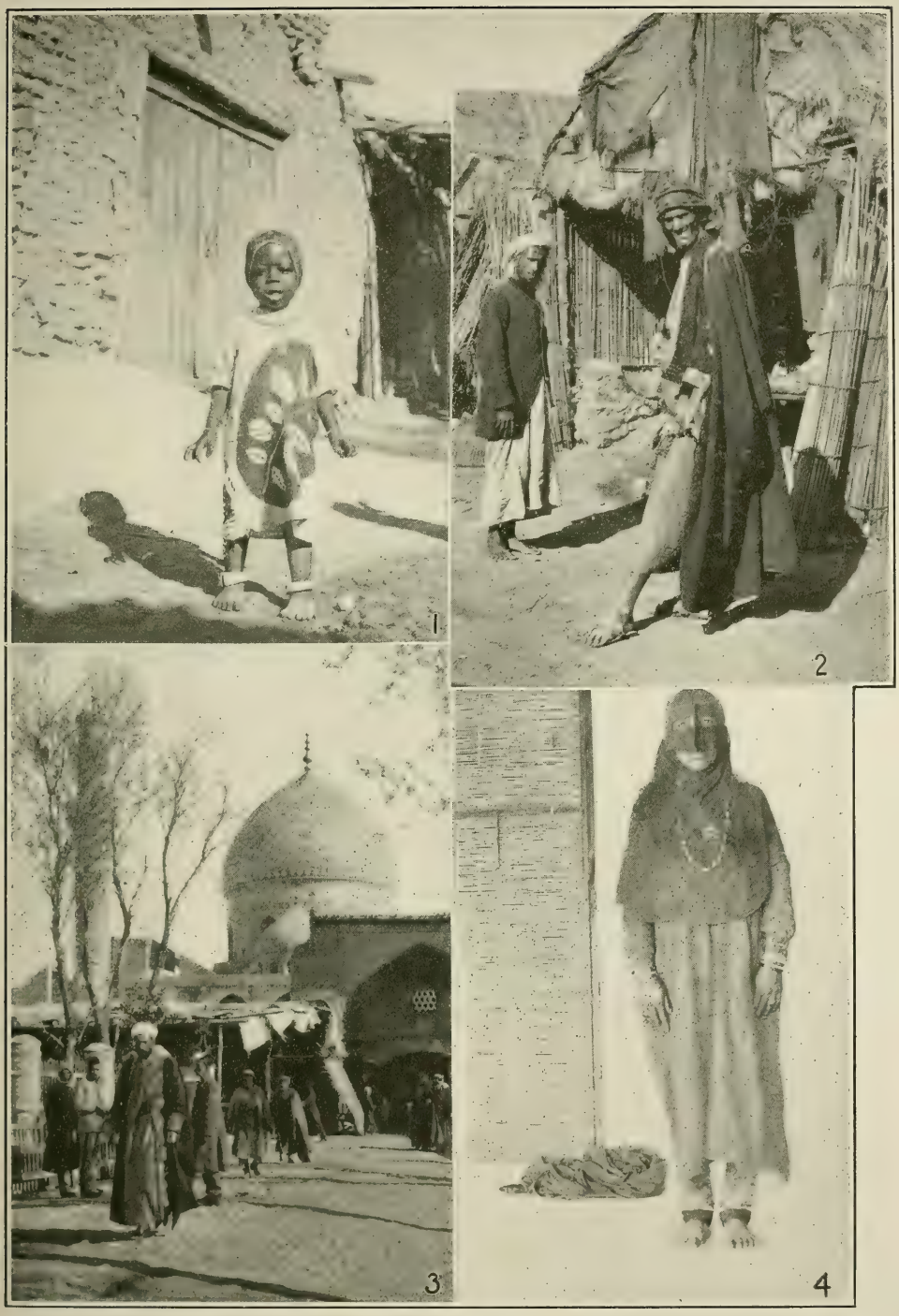
find immediately to make it pay, is difficult to discover, but to one familiar with the way in which our great West has been peopled, and the progress which is being made in matters of irrigation all over the world, the scheme of settling such portions of the Tigris Valley as can be irrigated does not seem a chimerical one. Under the present rule, however, it would be difficult to develop the country, as the hindrances to transportation, the methods of taxation, and the hundred and one difficulties of administration which characterize Turkish rule would be discouraging in the extreme, to any American capitalist at least.

So far as climate is concerned, however, the region appears to be as inhabitable as many portions of Arizona and California, the winters being delightfully pleasant and the summers no warmer than those of the desert regions of the Southwest. That the soil comprising large areas of this region is suited to the cultivation of many valuable crops is evident. In the small garden, one of the largest on the Tigris, however, of the Sheik Abdul Kader Kederry, I found growing a large variety of fruit and other economic plants, and, so far as the superficial observations of the writer are concerned, there appears to be no reason why any plant which grows in the Nile Valley and which can be cultivated in Arizona and southern California will not grow satisfactorily in that vast region. The cotton industry alone might find a very congenial home in that country, and from the samples examined it seems probable that a very good quality of Egyptian cotton could be produced there. As for the patches of alkaline soil, some of which are doubtless of large size, the question of their utilization would depend entirely upon the amount of irrigation water which could be furnished by the Tigris River, as the experiments in the delta region of the Nile have shown conclusively how easy it is to wash salt out of the soil sufficiently to enable profitable crops to be grown.

An examination of the wheat markets of Busra and Bagdad convinced the writer that excellent hard wheats can be grown in that region. Although it is probable that the varieties best suited to cultivation there would be those most in demand for macaroni-making, some soft varieties of good quality can doubtless be cultivated.

The commonest—in fact, almost the only—fodder crop of the region is the alfalfa, or "Djet," which is, without doubt, the widest distributed and most important fodder crop in the world. It is here grown, however, in garden fashion, small patches of a fraction of an acre seeming amply sufficient to supply the demand for forage for the donkeys and small herds of cattle which are kept by the natives along the river. In April the herbage of the desert is in its most satisfactory condition for grazing, and numerous small herds of cattle were seen from time to time along the banks of the river; but their condition indicated a lack of sufficient food, and I could not but compare these herds of half-starved animals with the well-nourished stock of the Argentine alfalfa fields or the tethered rows of sleek-looking Oriental cattle in the Berseem fields along the Nile. What the possibilities for stock-raising are in that region will depend entirely upon the amount of alfalfa and such other crops, as Alexandrian clover, that can be successfully grown. It is certain that races of animals can be found which will withstand admirably the scorching summer heat of the country.

There is one feature of Bagdad life which, though apparently small in itself, assumes a real importance to those who live in that Oriental town. It is the Bagdad boil. This boil deserves a more serious name, for it is generally more inconvenient and disagreeable than



Photos by Fairchild

1. A slave boy. His heavy anklets and bracelets are signs that he is held in bondage.
2. A date merchant at Busra.
3. A mosque in Bagdad.
4. A woman of Muscat, showing the peculiar veil used by the women of that region. The veil is elaborately embroidered.

a carbuncle, for it often attains unusual proportions and commonly lasts for eight or nine months. Every inhabitant of Bagdad is said, sooner or later, to suffer from one of these boils, Europeans and Arabians alike being susceptible to it; and so universal is it that old inhabitants of the region say that they can always tell whether a man has lived in Bagdad or not by the scar which it leaves somewhere on his body. In order to have a definite idea of its nature, the writer called at the Turkish hospital and interrogated the Turkish doctor in charge as to its nature. After very politely exhibiting a number of cases he gave me his opinion as to its cause: "*C'est l'eau, le climat et le soleil, Monsieur.*" In the opinion, however, of Dr Ramsey, the resident English physician of the place, this Bagdad boil is an infection arising from the sting or bite of an insect which he describes as a species of fly, and he recounted his own personal experience, in which he was conscious of the bite of this insect on the very spot on his forearm where the boil ultimately developed. This Bagdad boil would form a very interesting problem for some bacteriologist who was willing

Photo by Fairchild

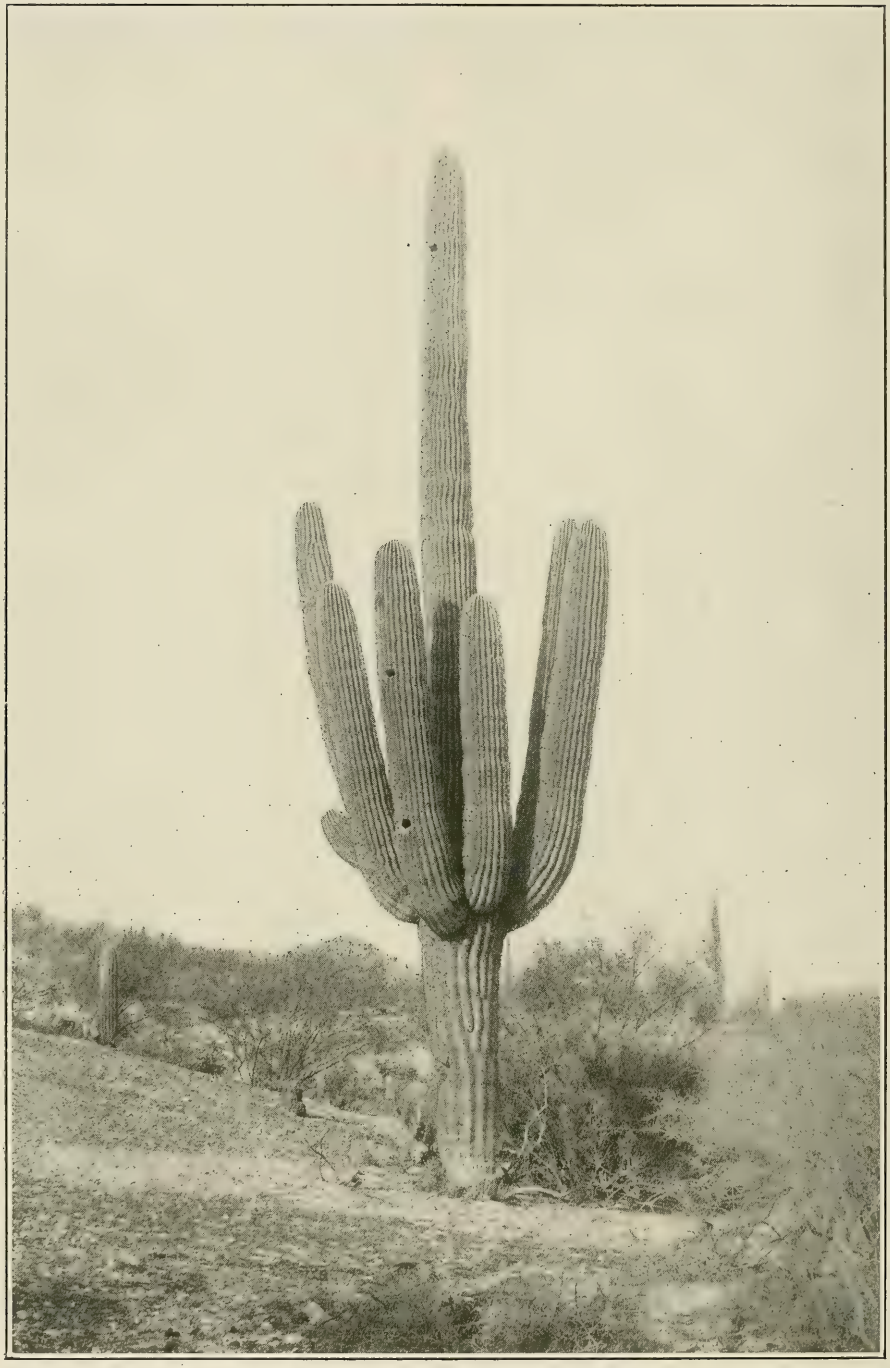
Women at Worship in a Church—Bagdad. (See page 151)

to leave the comfort of his laboratory and make the necessary trip to Bagdad. It is possible that since the writer's trip to the region the question has been thoroughly investigated.

It may be a disappointment to any one who should chance to read this short article, that little reference is made to the buried cities of Babylon and Nineveh, which are located in Mesopotamia, but such a disappointment can not compare with that of the traveler who was prevented, by lack of time, from visiting these historically interesting places. If one is to judge, however, from the descriptions which are given by the inhabitants of Bagdad, a trip to the ruins of Babylon can not compare in interest with the excursion to Sakkara or a visit to any one of the important temples of Egypt; mounds of desert sand, in which German assyriologists have made numerous excavations, and the almost characterless remains of the so-called Tower of Babel, being practically all that the drifting sands have left of that once great metropolis. More interesting, perhaps, would have been a visit to Kerbela, the Mecca of the Shia Mohammedans, which, although insignificant in size as compared with the real Mecca, must give one a clear idea of the nature of these remarkable pilgrimages.

While in Bagdad it was my good fortune tovisit one of the Christian churches on a Sunday morning, and, although as a traveler in the Orient I have seen many gay pageants of Siam, Japan, and India, no color scheme can compare with a churchful of Bagdad women, clad in their heavy silk *izars*. This *izar* of Bagdad differs from the garment generally worn by Mohammedan women in being dyed with the most gorgeous but delicate shades of pink, lavender, blue, and mauve, and in having woven into this delicately colored background, bold patterns or bands of gold and silver thread. The ample folds of this garment of thick, heavy silk, the broad surfaces of color when seen in masses, as I saw them from the choir loft of this Bagdad church, resembled, as the sunlight streamed in upon them through the plain glass windows, the color effects produced by a field of gigantic poppies. To one whose eyes are used to the infinite details of Parisian costumes, it is worth a trip to Bagdad to see such a sight as a churchful of Bagdad women.

Through the hearty coöperation of the American vice-consul in Bagdad, Mr Rudolph Hurner, and the very kind assistance of Mr H. P. Chalk, of Busra, I was able to get from the various Arab sheiks and date-planters a collection of young suckers of the most delicious date varieties of this great date-growing region. These were brought down the river, packed in Bombay, shipped to New York, and are many of them now growing in the coöperative date garden of Arizona as the gift of Mr Barbour Lathrop, of Chicago, to the American inhabitants of the arid Southwest. That date cultivation in this country is to be a success is indicated by the history of the successful introduction of many other foreign fruits and vegetables, and it is hoped that, as one of the results of this expedition, American tables may some day be supplied with those delicious varieties of Persian dates which are too delicate to bear the long shipment from the Tigris Valley to this country.



From Coville and Macdougal, Carnegie Institution

Saguaro or Giant Cactus (*Cereus giganteus*) near Tucson, Arizona

About 40 feet high. Birds nest in the cavities of the trunk

THE AMERICAN DESERTS

THE series of pictures on pages 152–161 illustrate the marvelous strength of desert plants. The size and luxuriance of the plants prove their wonderful vigor; but we are at a loss to explain the source or reason of their prosperity in regions where only a few inches of water fall during the year, and that little is immediately drunk up by the torrid sun. What enables the yucca (page 158) to thrust its head through thirty feet of gypsum sand, or the barrel cactus (page 158) to store enormous quantities of water, and to hold the water for months, perhaps years, or the sumach (page 156) to cling so tenaciously to its ground when everything else is swept away, are questions which none can satisfactorily answer. No less marvelous and inexplicable are the mesquite shrub, which sometimes has roots over fifty feet long, and other desert plants whose hairy coverings and resinous coatings prevent the evaporation of moisture.

On his return from the Death Valley expedition in 1891, Mr Frederick V. Coville was so impressed with the necessity of thoroughly understanding the strength of desert plants that he planned the establishment of a desert botanical laboratory. His botanical explorations in the Death Valley had enabled him to recognize the major problems of such an investigation, and to outline plans for further researches. The importance of such work was seen at once, but it required much more time and money than were available. When the Carnegie Institution was established Mr Coville presented his long-cherished project. The board approved the plan and made a grant to build a laboratory at Tucson and to carry on researches at this point. The experiments, directed by Mr Coville and Dr D. T. MacDougal, are under the immediate care of Dr W. A. Cannon, as resident investigator, and their object at present is to investigate the special devices of desert plants for the absorption and storage of water and for resisting substrata of unusual composition, like the gypsum sands of the Tularosa Desert.

A complete solution of the mysterious strength of desert plants will prove of great economic value to the United States aside from the important information it will give regarding the fundamental processes of protoplasm. In former times bands of roaming Indians inhabited the desert regions of the southwest. They lived in comparative abundance, and yet the country was no less arid than it is today. Doubtless they obtained food from the plants of the desert just as easily as the Papago Indian shown on page 158 is obtaining drinking water from the barrel cactus. White men can do likewise as soon as they understand these plants, and will find many practical uses for the cactus and yucca. An understanding of the source of strength of desert plants will also enable the farmer who irrigates his semi-arid land to judge how much water to apply and how often in order to gain the best results. It will also help him to develop alkali and drouth-resistant types and thus to reclaim new areas.

The first report of the laboratory has been published by the Carnegie Institution.* It describes a systematic tour of the deserts by Messrs Coville and MacDougal in 1903 and gives a useful account of the characteristic vegetation of the different deserts. It is superbly illustrated with 29 plates, from which those given in this abstract are selected. Tucson was chosen as the site of the laboratory because it has a climate of a thoroughly desert character and a rich

* Desert Botanical Laboratory of the Carnegie Institution. By Frederick V. Coville and D. T. MacDougal, Washington, Carnegie Institution, 1903.

From Coville and MacDougal, Carnegie Institution

Tree Yucca (*Yucca radiosa*) in the Tularosa Desert, New Mexico

The large plant, which is in fruit, has lost some of its lower leaves by the nibbling and rubbing of cattle. The two small plants are younger specimens of the same species.

From Coville and MacDougal, Carnegie Institution

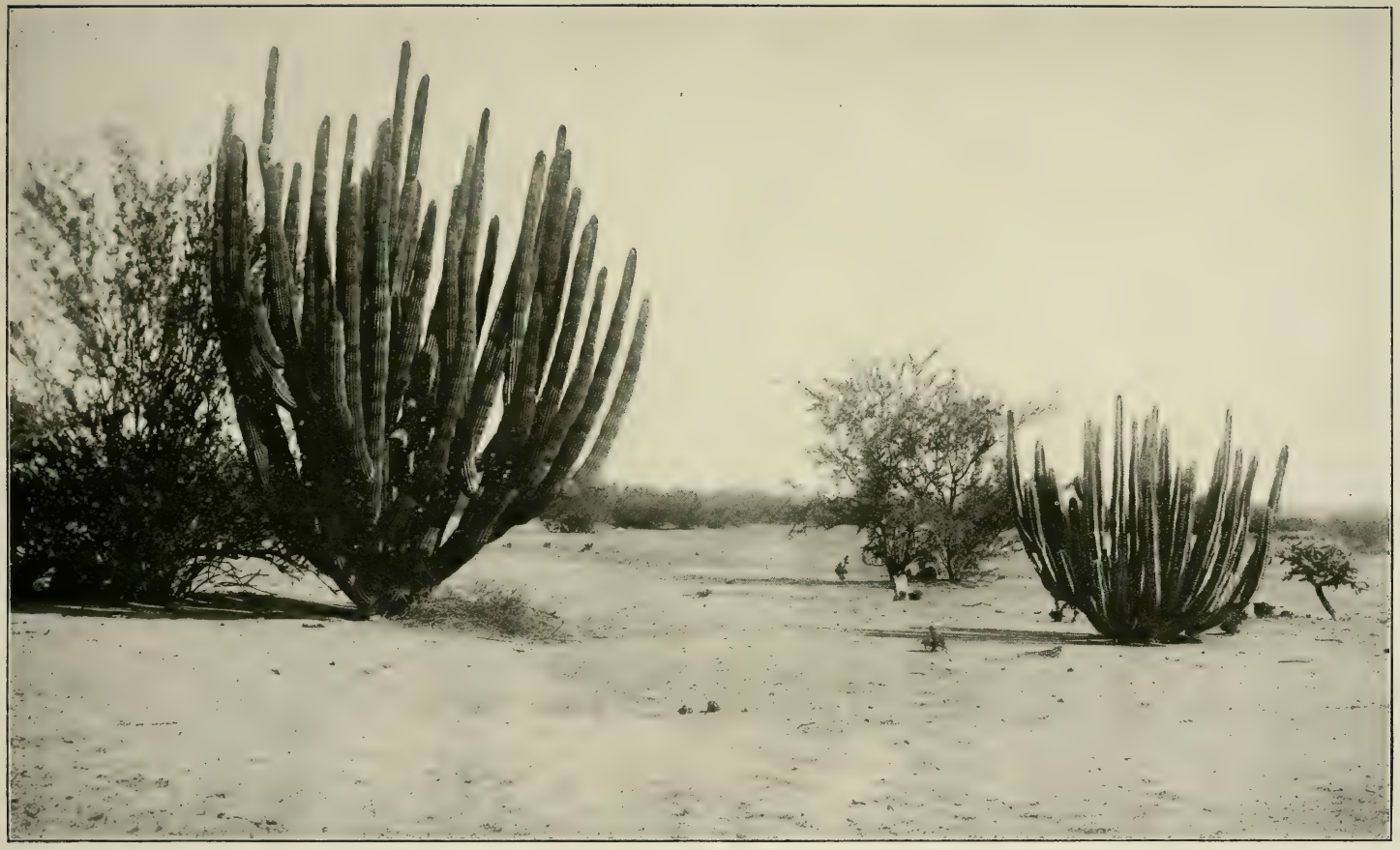
Tree Yucca (*Yucca radiosa*) Growing Up Through a Dune 30 Feet High, White Sands, New Mexico

A few of the upper circles of leaf bases can be seen in the picture. (See page 153)

From Coville and MacDougal, Carnegie Institution

Sand Column, in the White Sands, New Mexico, Caused by the Protection Afforded by the Three-leaved Sumac Growing Over It

Distance from base to summit of column about 15 feet. A striking example of the binding and protecting strength of this bush. It is the most characteristic plant of the White Sand dunes



From Coville and MacDougal, Carnegie Institution

Vegetation of the Sonora Desert, near Torres, Mexico

The cactus on the left is the pitahaya (*Cereus thurberi*), about 20 feet high ; the one on the right is *Cereus schottii*

From Coville and MacDougal, Carnegie Institution

Papago Indian Obtaining Drinking Water from a Barrel Cactus (*Echinocactus emoryi*) West of Torres, Mexico. (See page 159)

flora and is centrally located with reference to the deserts of Texas, Chihuahua, New Mexico, California, and Sonora. The town has a population of 10,000, who have presented the laboratory with a convenient site and have aided it in many other ways.

Tucson, for centuries before the landing of Columbus, was one of the permanent settlements of the ancestors of the Papago Indians of today. These Indians were partly migratory, moving southward in autumn to hunt in the sierras during the winter and returning in spring to replant their crops.

They scoured the Sonoran plains for chance water-holes, as well as more permanent waters, carrying religiously hoarded seeds; they chased rainstorms seen from commanding peaks for scores, if not hundreds, of miles, and wherever they found standing or running water, or even damp soil, they planted their seeds, guarded and cultivated the growing plants with infinite patience, and, after carefully harvesting the crop, planted some of the finest seeds as oblations and preserved others against the ensuing season, so that the crop plants were both distributed and improved from year to year.

It was among the desert hills west of Torres that the writers had an opportunity to see a Papago Indian extract from a bisnaga (*Echinocactus emoryi*), or barrel cactus, water with which to quench his thirst. He cut the top from a plant about five feet high, and with a blunt stake of palo verde pounded to a pulp the upper six or eight inches of white flesh in the standing trunk. From this, handful by handful, he squeezed the water into the bowl he had made in the top of the trunk, throwing the discarded pulp on the ground. By this process he secured two or three quarts of clear water, slightly salty and slightly bitter to the taste, but of far better quality than some of the water a desert traveler is occasionally compelled to use. The Papago, dipping this water up in his hands, drank it with evident pleasure and said that his people were accustomed, not only to secure their drinking water in this way in times of extreme drouth, but that they used it also to mix their meal preparatory to cooking it into bread.

WHAT IS A DESERT?

The current conceptions of deserts are neither adequate nor correct if the descriptions in the best dictionaries and cyclopedias are to be taken as an index. A work of wide circulation and use defines a desert as "A region that is wholly or approximately without vegetation. Such regions are rainless, usually sandy, and commonly not habitable."

The insufficiency of the above description rests upon faulty observations and upon the failure to recognize the fact that the habitability of a region is no criterion of its arid character. The development of modern methods of transportation has made possible the maintenance of dwellings and towns with a considerable population at one or even two hundred miles from the nearest supply of water. Even such facilities are not necessary to the sustenance of a population in deserts of the most extreme type, as illustrated by the Sahara, which has a population of two and a half million people. So far as the vegetation is concerned, the actual number of individuals is much less than on a similar area in a moist climate. This, in fact, is one of the chief characteristics of a desert, but it would not be safe to estimate the total number of species much below the average number. Lastly, be it remembered that local topography has but little influence on the desert character of a region. Sandy flats, plains, valleys, and rocky hills reaching to such altitudes as to become mountains are included in some desert tracts. It follows as a natural consequence of the sparse vegetation as one factor that the surface

layers of the substratum, being usually dry in arid regions, are readily shifted and worn by winds.

THE CAUSES OF A DESERT

The term desert may be applied to areas of the earth's surface which support a sparse vegetation of a more or less specialized character, owing to inadequate rainfall or to the unsuitable composition or lack of soil. Of these conditions, scanty water supply may be regarded as of the greatest importance, and it is to this factor that most deserts owe their existence. Desert conditions arise in any region in which the rainfall is markedly less than the amount of water that evaporates from the surface of this liquid in the open air. As the amount of evaporation naturally increases from the polar regions toward the tropics and is affected by winds and elevation, it follows that no arbitrary amount of rainfall may be designated as an invariable cause or accompaniment of arid or desert conditions. Thus in certain portions of the tropics a rainfall of less than 70 inches results in aridity, while some of the most fertile agricultural districts in the north and south temperate zones receive scarcely one-third this amount.

Regions in which precipitation is less than evaporation are characterized by a lack of running streams or of a permanent run-off, although in some instances these districts may be traversed by large rivers which have their sources in distant mountain ranges, as in the case of the Nile in Africa and of the Colorado River in America. The rainfall in a desert may be so heavy at certain seasons as to produce torrents of great volume, which, rushing downward over the slopes and mountain sides, wear distinct streamways extending out into the plains below, in some instances for miles; but the flow soon ceases after the rains have passed, and the stream beds become dusty channels until the next rainy season. Striking examples of such streamways are to be seen in the great Sonoran desert in northwestern Mexico. It is evident that districts in which the average rainfall is not much greater than the evaporation are in a very critical condition, since in seasons of minimum precipitation the amount of water received may be less than that lost, and drouth may result, often with direful effects on agricultural operations and economic conditions in general.

The seasonal distribution of the rainfall is a matter of importance in regions where evaporation is nearly as great as precipitation. If the rainfall occurs within a brief period, the remainder of the year must be extremely dry, and the region will show distinct desert conditions, with a tendency on the part of the native plants to develop marked storage capacity for water. The distribution of the scanty rainfall throughout the year in any region will favor the development of slowly growing xerophytic forms.

Arid deserts occur in all of the great land divisions and reach an enormous extent in Africa, Asia, and Australia. The most pronounced desert conditions of South America are found on the western slopes and benches of the Andes. One locality, that of Copiapo, has an average precipitation of 0.4 inch per year, and, so far as known, is the driest spot on the earth's surface. The deserts of North America are confined to the Cordilleran region and occupy plateaus and plains east and west of the main ranges to an extent of more than a million square miles.

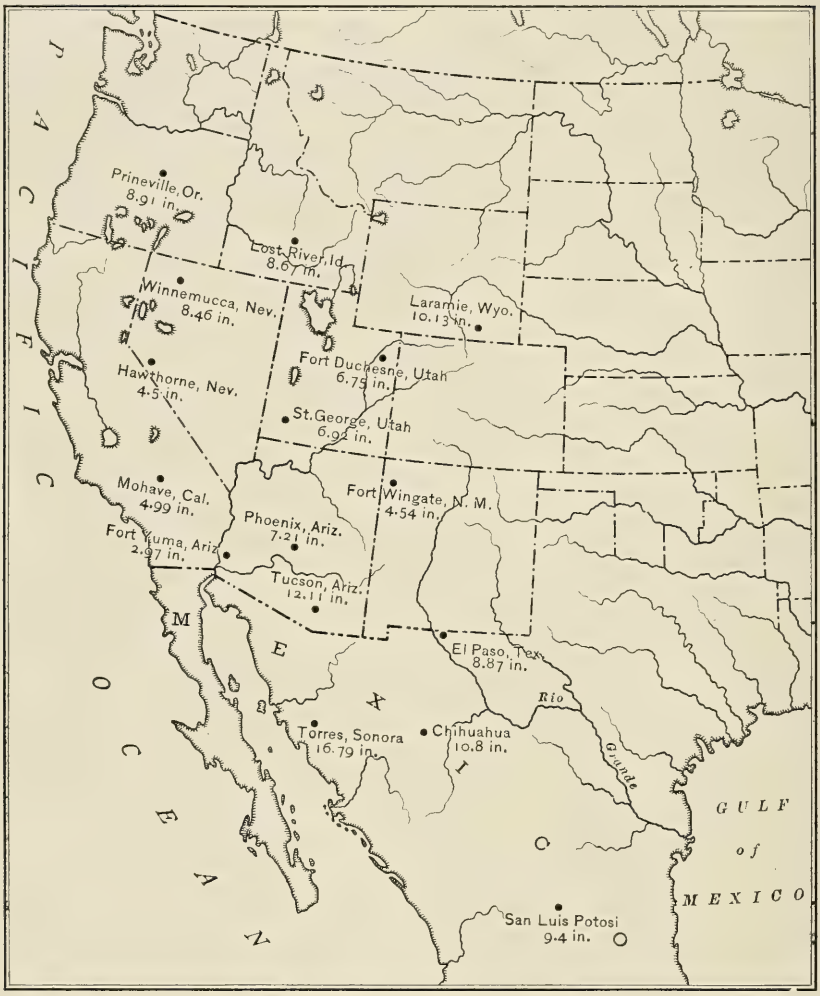
THE AMERICAN DESERTS

A study of the physiographic, floristic, and meteorological features of western North America has resulted in delimiting two great desert areas by the geographer, botanist, and meteorologist. The outlines of these might be roughly

From Coville and MacDougal, Carnegie Institution

Group of Palms in the Colorado Desert, California

Old discarded leaves are lying under the trees



Location of and Annual Precipitation at Certain Stations in the Arid Region of Western America. Chiefly from Records of the U. S. Weather Bureau

traced by lines connecting the stations shown in the accompanying map. These regions may be designated as the Sonora-Nevada Desert and the Chihuahua Desert.

The Sonora-Nevada Desert embraces portions of Utah, Idaho, Washington, Oregon, Nevada, California, Arizona, Baja California, Sonora, and Sinaloa. The northern portion of this region is mainly comprised in the Great Basin, and embraces the beds of a number of ancient lakes and the surviving Great Salt Lake. Other special physiographic features of interest in this connection are the areas which bear the names of Snake River Desert of Idaho, the Sage Plains of Washington, the Lava Beds of

Oregon, the Ralston Desert in Nevada, Death Valley, Mohave Desert, Colorado Desert, Salton Desert, in southern California and Arizona; the Painted Desert in Arizona and New Mexico, and the Sonora Desert in Mexico. The southern portion of the region consists of a series of extended slopes and terraces traversed by many ranges of hills and mountains with peaks of some altitude. Along the shores of the Gulf of California and of the Pacific Ocean proper, the desert area includes the entire surface to within a few feet of the water's edge, and the xerophytic vegetation of the plains comes into direct contact with the mangrove and strand flora.

The Chihuahua Desert occupies the central tableland of Mexico east of the Sierra Madre, extending as far south as San Luis Potosi, and including parts of the states of Coahuila, Chihuahua, and Texas, and also portions of Arizona and New Mexico. The Bad Lands of the Dakotas and Montana and the Red Desert of Wyoming might be regarded as a northern arm of this region for the purposes of this paper. The arid portions of this area consist, for the most part, of great valleys inclosed by parallel ranges of mountains, which in some instances attain such altitudes as to be timber-clad and even bear an alpine vegetation.

One of the striking features of the Chihuahua Desert consists of the great sand dunes, or "medanos," more than a hundred feet high, in some instances forming great ridges that have almost the imposing appearance of mountain ranges; these move across the floor of the desert plains with a sweep that obliterates minor features of topography. These moving dunes bear a characteristic vegetation adapted to the unusual physical conditions offered by the sand and lack of water and nutrient material. The gypsum deposits forming the White Sands in the Tularosa Desert north of the Rio Grande possess unusual chemical properties. The Jornada del Muerto (Journey of Death) of the ancient Spanish explorers lies in the western portion of the Chihuahua Desert in New Mexico separated from the Tularosa Desert by the Organ Mountains. Farther northward the great stretches of *malpais*, or black volcanic rock, form a desert district of the extreme type, while numerous areas are impregnated with alkali, and are either almost wholly free from vegetation or support only halophytic species. The Bad Lands of Dakota owe their desert character to the peculiar composition of the soil, which is clayey, poor in nutrient substances, and subject to great erosion, so that extensive areas are destitute of vegetation of any kind.

THE INTENSITY OF DESERTS

The most interesting feature of the report is a table showing the intensity of the deserts—the ratio of rainfall to evaporation—in the arid regions in the United States.

From this table it appears that Fort Yuma is the driest spot in the country, its rate of evaporation being 35.2 times greater than its normal rainfall.

Place.	Annual precipitation.				Annual evaporation (estimated).	Ratio.
	No. of years.	Max.	Min.	Mean.		
		In.	*In.*	*In.*	*In.*	
El Paso	24	18.30	2.22	9.32	80	8.7
San Luis Potosi	1	.....	.....	10.41	.....	.....
Chihuahua	1	.....	.....	10.86	.....	.....
Fort Wingate	39	25.00	6.37	14.00	80	5.7
Fort Yuma	26	5.86	0.60	2.84	100	35.2
Phœnix	18	12.83	3.77	7.06	90	12 7
Tucson	25	18.37	5.26	11.74*	90	7.7
Mohave	26	21.38	2.20	4.97	95	19.1
Hawthorne	14	8.35	1.89	4.50	80	17.5
Winnemucca	22	11.91	4.89	8.31	80	9 6
St. George	13	9.81	3.55	6.46†	90	13.9
Fort Duchesne	15	11.43	4.36	6 49	75	11.6
Prineville	6	11.64	7.49	9.01	70	7.8
Lost River	7	11.86	6.22	8.47	70	8.3
Laramie	13	34 42	8.56	9.81	70	7.1
Torres	1	.....	.....	16.79	100	6.0

* From 15 years' observations.
† From 22 years' observations.

Menelik, King of Ethiopia, Awaiting the Arrival of U. S. Commissioner Skinner, in the Aderach or Imperial Parlor

CONSUL SKINNER'S MISSION TO ABYSSINIA

ROBERT P. SKINNER, U. S. consul-general at Marseilles, who was sent on a special mission to Abyssinia, in November of last year, to negotiate a trade treaty with King Menelik and to gather information respecting the commercial resources of that country, has made a brief report of his mission to the Department of State. As a result of Mr Skinner's efforts a treaty has been negotiated with the Emperor's government which, if ratified by the Senate, will secure to the United States for all time the privileges of the most favored nation in Ethiopia, and at the same time guarantee to our citizens and to our merchandise immunity from discrimination in rates upon all public roads and lines of communication. The following paragraphs are extracted from Mr Skinner's report:

Acting on behalf of the Agricultural Department, I have secured a collection of the seeds of the more important crops peculiar to Ethiopia, a number of which may be found valuable in the exploitation of the uncultivated western lands of the United States. A collection of wild coffee seeds for experimental purposes could not be obtained during my visit, but have been ordered and will be ultimately forwarded. Such a collection could only be found in Kaffa, a remote province of the country, access to which involves a long and expensive journey. The experts of the Agricultural Department have a theory that the degeneration of the modern plantations is due to the fact that coffee culture has been based upon seed originally imported from Arabia, and that by getting back to the wild coffee plant, the habitat of which is the province of Kaffa, a new variety may be created, the value of which will be incalculable. My endeavor to obtain a pair of large zebras for cross-breeding purposes was also in vain. These animals are exceedingly rare and difficult to capture alive. I have left instructions, however, in regard to this matter, and trust to be able to supply two of these animals sometime in the future.

The journey from Djibouti to Dire-Douah was made over the barely completed railroad, a distance of 186 miles. At this point camels were procured for the baggage and supplies, and mules for mounts. Our party of thirty succeeded in departing from Dire-Douah on November 28 for the capital, where we arrived December 18, camping about three miles from the Emperor's palace. Our arrival was the signal for prompt calls from M. Léon Chefneux, counselor of state, and one of the two foreign advisers of the Emperor, M. Alfred Ilg being then absent in Europe. Two hours later, accompanied by M. Chefneux, the mission set out for the aderach, or seat of government, accompanied by an Ethiopian escort of 3,000 men under the command of a distinguished general.

Although our reception at Harrar had not been devoid of military pomp, we were all astonished and our appreciation of the picturesque gratified by this first glimpse of Ethiopian troops upon a ceremonial occasion. Arrayed in gorgeous silks and satins, with lion and leopard skin mantles, gold and silver plated bucklers, carrying lances from which floated the national colors, mounted upon spirited horses, they galloped into formation, the very order of which was an apparent disorder, shifting like a kaleidoscope and constituting a scene as indescribable as it was memorable. A band of shawm-players heralded our coming with weird music which has not changed since the fall of Jericho.

At the palace, or guebi, our escort fell back, and the mission, always accompanied by the marines and blue

jackets, proceeded through a series of court-yards, and after receiving a salute from a company of 200 native artillerymen under the command of a European officer, and a further salute of 21 guns in honor of the United States, we entered the aderach, an audience chamber of cathedral-like proportions and form. The Emperor sat upon his throne, surrounded by his more important advisers, representing the administrative departments, the judiciary, the army, and the church, and back of the two rows of pillars supporting the roof were massed several thousands of the leading people of Addis-Ababa, all in holiday regalia. Our reception was cordial, but formal. Within half an hour the members of the mission accompanied by the escort of Ethiopian troops, which had waited outside, and augmented by the Emperor's private band, playing European instruments, and by native troops uniformed and marching in European fashion, left the palace for a compound assigned to us.

Nine days were spent in Addis-Ababa with daily conferences over the treaty with the Emperor or his foreign advisers. A farewell audience was arranged and took place on the afternoon of December 27, immediately prior to which the Emperor sent to me two young lions and a pair of elephant tusks, together with a personal letter addressed to the President, requesting me to deliver these testimonials of his friendship and good will upon my return to the United States. In further manifestation of his satisfaction, at the conclusion of this final audience, he tendered decorations to all the officers of the mission and presented medals to the marines and soldiers.

Probably for the first time in the modern history of Ethiopia has a foreign mission visited the country upon an errand of peace and amity, bringing no vexed question of territorial integrity or national honor to decide, and neither asking nor granting anything to which both sides could not accede.

Ethiopia being without a seaport and hemmed in by three European powers, each one striving to supplant our merchandise, we came none too soon to protect our trade by the negotiation of a treaty which should guarantee equal treatment to our merchandise, not only in respect to import duties, but, more important still, in respect to equal rates of transport.

Ethiopia is wealthy in resources beyond the power of any man to calculate. Gold, silver, asphalt, petroleum, iron, and coal exist in combination with a salubrious climate, agricultural productiveness, and a population of singular docility. With watchful eyes upon the future, the Emperor seeks to preserve the political independence of his people, which has been handed down through the centuries, and in the meantime he hopes to develop the intelligence and resources of the population of 10,000,000 to such a point as to enable it to withstand any pressure from without.

The Development of Nevada. No state in the Union has so long and so badly needed an increase of population as has Nevada. Her population of 42,000 today is less than it was in 1870, six years after her admission as a state. It is gratifying to know, therefore, that she will more than double her present numbers when the vast government irrigation works begun on the Truckee and Carson Rivers are completed. It is estimated that the works will make productive about 375,000 acres of sage brush desert in the western part of the state. These lands will furnish fertile homesteads of about 80 acres each for 4,500 families. Towns and villages will naturally spring up, so that Nevada may expect from the reclamation an increase of 60,000 at the least.

THE SAILING SHIP AND THE PANAMA CANAL

By James Page, U. S. Hydrographic Office

IN the minds of a majority of those whose lives have been spent in the interior, and to a certain though less widespread extent among those whose daily vocation has brought them in touch with the sea, the opinion is current, always expressed in a tone of regret, that the value of the wind as a motive power in transportation by water is no longer worthy of study, and that the sailing ship as a factor in commerce is shortly to take its place on the shelves of the museum of antiquities beside the Roman trireme. No such apprehension need exist. Of the net tonnage of the world quoted in Lloyd's summary for the year 1903–'04, amounting to 23,282,000 tons all told, 6,466,000 tons, or in the neighborhood of 28 per cent, is still credited to sailing vessels, the number of bottoms being 17,761 and 12,182, steam and sail respectively.

THE UNITED STATES SECOND IN SAILING TONNAGE.

With regard to flag, the United States, the most progressive among nations in the application of machinery, strange to say, stands high in the list in the relative proportion of sail to steam. For this country the figures given are 1,390,000 tons sail and 1,566,000 tons steam, respectively, America, in the absolute amount of sailing tonnage, standing far in advance of all other nations, with the single exception of Great Britain, and in the relative amount, as compared with steam, in advance of all save two, Italy and Norway, in both of which latter the total amount of sailing tonnage still exceeds that of steam.

An explanation of the erroneous impression which exists as to the importance of sailing tonnage may be found in the fact that it is in a majority of cases derived from a casual inspection of the merchant fleets in the northern harbors of the Atlantic seaboard—Boston, New York, Philadelphia, and Baltimore—ports in which the passenger and express traffic exercises a preponderating influence. Here, indeed, the eye will often seek, and seek in vain, amid the series of smoke-begrimed funnels and uncouth hulls which line the docks, for the taut rigging, the trim spars, and the graceful lines of the clipper ship. In the more southerly Atlantic ports and along the Pacific coast the sailer is a more frequent visitor. In the fiscal year 1901–'02, according to the report of the Bureau of Statistics upon the foreign trade of the United States, the total number of vessels entering the port of New York from abroad was 4,127, with a total tonnage of 8,893,000. Of this number, 974, embracing 484,000 tons, were sailing vessels—*i. e.*, 24 per cent of the whole number of entries, carrying but 5 per cent of the whole tonnage. In the port of Pensacola, on the other hand, one of the most active in the Gulf district, the aggregate number of entries was 344, the total tonnage amounting to 428,000. Of this number, 180 were sailing vessels, carrying 140,000 tons—*i. e.*, 52 per cent of the total number of vessels, carrying 33 per cent of the total tonnage.

On the Pacific coast the same general features obtain, although here the contrast between express and freight ports is by no means so marked. The returns for the same year show for the port of San Francisco 580 entries, with a total tonnage of 1,016,000. Of this 269 were sailing vessels, with a capacity

of 436,000 tons, the number of sailing entries thus amounting to 47 per cent of the whole, carrying 43 per cent of the total tonnage. Going north to Portland, however, where the freight traffic (lumber and grain) alone is important, the number of entries is 129, with a total tonnage of 236,000, distributed between 25 steamers and 104 sailing ships, the tonnage of these latter amounting to 177,000, or 75 per cent of the whole.

For the several seaboard districts of the United States the figures for the fiscal year 1901–'02 in their entirety are as follows :

	No. of entries.	Per cent.	Tonnage.	Per cent.
Atlantic :				
Total	11,187	100	17,145,000	100
Steam	7,296	64	15,822 000	92
Sail	3,891	36	1.323,000	8
Gulf :				
Total	3,478	100	3,956,000	100
Steam	2,340	67	3,389,000	86
Sail	1,138	33	567,000	14
Pacific :				
Total	3,264	100	3,261,000	100
Steam	2,909	75	2,205,000	68
Sail	955	25	1,056,000	32

THE PACIFIC THE CRUISING GROUND OF THE MODERN SAILER

A fact worthy of note is established by a comparison of the figures here given for the Atlantic and the Pacific coasts. On the former the total freight landed in the country from foreign ports by sail amounted to 1,323,000 tons, the number of cargoes being 3,981. The average cargo was thus in the neighborhood of 350 tons. On the Pacific coast the freight brought by sail amounted to 1,056,000 tons, the cargoes, however, numbering but 955, or on the average about 1,100 tons. In other words, the average tonnage of the sailing vessel on the Atlantic is but one-third of that on the Pacific. The fact is significant as going to show that the latter ocean is at present, and is likely to remain for many years to come, the cruising ground of the modern sailing ship, the growth of which during the last two or three decades has been considerable, although not so startling as that of her younger but gigantic sister, the modern steamer.

FAMOUS AMERICAN CLIPPERS.

The American clippers which astonished the world by their wonderful performances in the 50's—the *Flying Cloud*, which made the voyage from New York to San Francisco in 84 days; the *Northern Light*, which made the return voyage in 77 days; the *Sovereign of the Seas*, which left New York Saturday, June 18, and anchored in the harbor of Liverpool July 1, 1852, having sailed across the Atlantic in less than 14 days—were not large vessels, as measured by present-day standards, the first two being less than 2,000 tons burthen, the last less than 2,500 tons. Even as late as 1880 the list of merchant shipping of the United States mentions but 19 sailing vessels of a tonnage greater than 2,000, while at the present time sailing ships of 3,000 tons and upward are not exceptional, the limit for the time being having been reached for for-and-aft rig in the seven-masted steel schooner, *Thomas W. Lawton*, 5,008 tons, built at Quincy, Mass., and for square rig in the five-masted steel bark *Preussen*, 5,081 tons, built in 1902 for the Laeisz shipping agency of Hamburg.

The achievements of this vessel, the largest of her class, in the matter of speed, as also those of her sister ship, the *Potosi*, have excited much interest, not only as evincing superior construction and masterly handling, but also in view of the support they lend to the belief that the sailing ship has not yet attained those dimensions attended by maximum speed. The most remarkable performance of the *Preussen* thus far has been the completion of the voyage from the Channel to Iquique, Chile, a distance of 12,000 miles, in 57 days—about the time made by the steam freighters engaged in the South

American trade. On this voyage the vessel took her departure from Ouessant March 5, 1903, and crossed the line March 18, thirteen days out, establishing a record never before equaled by a sailing ship. The parallel of 50° S. in the Atlantic was attained April 10, and in the Pacific April 21, eleven days being thus spent in weathering that most tempestuous of regions, Cape Horn. From noon of April 23 to noon of April 24 the vessel laid down 368 miles to her credit, this being the best day's run throughout the voyage. The anchor was dropped in the harbor of Iquique May 1, fifty-seven days from point of departure to destination.

Prime among the factors which are to exercise an influence over the relative use of sail and steam in navigation is the question of the cost of fuel, and the proportion of the steamer's carrying capacity, which must be devoted to its transportation. Given ports of departure and destination not too remote from each other, and coal cheap at both ends of the line, the sailing ship has but little chance of survival. In longer voyages, say those of 6,000 miles and upward, the space which must be allotted to fuel in the case of the steamer becomes considerable, and may cut down the cargo-carrying capacity to such a degree as to seriously interfere with the profits of the voyage. Coaling stations remedy this evil to some extent; but at these coal is always expensive, rising at some points to as much as $15 per ton, while their frequent use, furthermore, is liable to unduly protract the voyage in point of both distance and time. In the event of the successful application of low-grade petroleum for use as fuel at sea, many of these difficulties will of course disappear.

TIME SAVED BY A KNOWLEDGE OF THE METEOROLOGY OF THE SEA.

A factor by no means generally recognized, but of vast importance to profitable navigation by sail, is the better knowledge which we are gradually acquiring of the meteorology and physical geography of the sea. The era of record passages is closed, and sailing ships are no longer urged to their utmost speed in the hope of outstripping a rival, even at the sacrifice of cost and safety. As a consequence, the study of the winds and currents of the sea has not the vital interest which it possessed in the days of Maury, when the relative performance of the *Sea Witch*, the *Dreadnought*, the *Invincible*, the *Oriental*, and other like fancifully named craft was a matter of international discussion. The investigation has, however, gone earnestly forward, and the sailing ship has reaped the benefit in the shape of greater security, quicker passages, and larger profits. First among the national institutions interested in this work is the Deutsche Seewarte, having its central office in Hamburg, Germany, and a single instance will serve to show the practical value of the results which have been accomplished in this direction. The exportation of saltpeter from the nitrate ports along the west coast of South America to Europe is handled exclusively by German sailing ships, and the best sailing route from the English Channel to the coast of Chile and return has since the inception of this trade been made the subject of special investigation by the Seewarte. As a result of this study the time of passage has steadily diminished. During the early 70's, the epoch at which the trade first became active, the voyage from the Lizard to Valparaiso occupied over 100 days. Careful discussion of the material meanwhile accumulated, leading not so much to change in the route as to more intelligent handling of the vessel by the shipmaster under given meteorological conditions, has succeeded in reducing this time materially, the successive steps of the improvement being as follows:

1876–1880, 18 passages; average time, 102 days.

1881–1884, 38 passages; average time, 91 days.

1885–1888, 64 passages; average time, 88 days.

1889–1892, 83 passages; average time, 83 days.

With this much said in support of the claim that navigation by sail is still a factor in freight transportation, fulfilling in the case of a long voyage a sphere for which the steamer is ill-adapted; that it even has a future of increased usefulness before it, and that its interests must be considered in any broad scheme whose aim is the promotion of the world's commerce, the question of the value of the proposed interoceanic canal from the point of view of the sailing ship is worthy of consideration.

Although not so unfortunately situated in this respect as the Suez Canal, where the Red Sea, with its strong monsoon winds, numerous shoals, and intricate passages, interposes an insuperable obstacle to navigation by sail, the neighborhood of the proposed American canal is by no means free from difficulty. The whole isthmus from Tehuantepec eastward to Colombia lies within the tropics, and the climate exhibits the characteristic tropical feature to a marked degree. The year is divided into two seasons, the wet and the dry, the former lasting from May to December, the latter from January to April. In the vicinity of Colon (latitude 9° 22′ N., longitude 79° 55′ W.), the Atlantic terminal of the canal, and of Panama (latitude 8° 52′ N., longitude 79° 31′ W.), the Pacific terminal, the average annual rainfall amounts to 125 inches and to 47 inches respectively, distributed throughout the several months as follows:

	Colon.	Panama.
January	1.9 inches.	0.5 inches.
February	1.5 "	0.0 "
March	1.3 "	0.2 "
April	2.7 inches.	0.9 inches.
May	11.6 "	5.3 "
June	13.9 "	5.2 "
July	14.3 "	4.5 "
August	14.9 "	5.7 "
September	12.6 "	7.3 "
October	13.8 "	6.9 "
November	23.6 "	5.6 "
December	12.2 "	4.8 "
	124.3 "	46.9 "

At both places the average monthly temperature is 79° Fahrenheit, the variation from month to month being insignificant. The extreme temperatures are 68° and 95° Fahrenheit. The relative humidity is of course excessive, ranging from 90 per cent during the early forenoon hours to 75 per cent during the afternoon.

THE WINDS OF THE ATLANTIC END OF THE CANAL.

With regard to that feature of the weather most essential to navigation by sail, viz, the winds, the northeast trades blow home to the Caribbean coast throughout practically the entire year. They attain their greatest force and their most northerly direction during the dry season (January–April), and it is during these months that along the eastern coast of Central America the dreaded "northers" occur—storms which give so little warning of their approach and blow with such dangerous violence that steamers calling at Colon are invariably required to keep up steam in order that they may be able to slip their cables and put to sea at a moment's notice. As the wet season advances the trades weaken in force, at the same time inclining to southeast; and at its height, during August and September, brief periods of southwesterly winds occur, these, however, being no longer the northeast trades of the Atlantic, but the prolongation of the southeast trades of the Pacific, which, reaching across the equator into northern latitudes, are converted by the earth's rotation into southwesterly

winds and at intervals attain sufficient force to traverse the isthmus.

A sailing vessel approaching the coast from the eastward will thus experience but little difficulty on the score of wind. Once within the chain of islands enclosing the Caribbean Sea, a straight course may in general be shaped for the entrance to the canal, and the trades, although light in force during a large portion of the year, will serve to bear her to the desired haven. Currents also will assist, for throughout the entire sea, except in the immediate neighborhood of the coast of Cuba on the north, and of Venezuela and Colombia on the south, the motion of the surface water is to the westward.

The log of a sailing vessel emerging from the eastern terminus of the canal into the Caribbean will tell a different story, the conditions which facilitated to such a degree the approach toward the port of Colon serving in like measure to embarrass departure from it. To steer a direct course in the face of the trades will be impossible, and no matter what her ultimate destination, the square rigger will find it necessary to seek an outlet from the Caribbean Sea by way of the Yucatan Channel, and thence through the straits of Florida into the Atlantic.

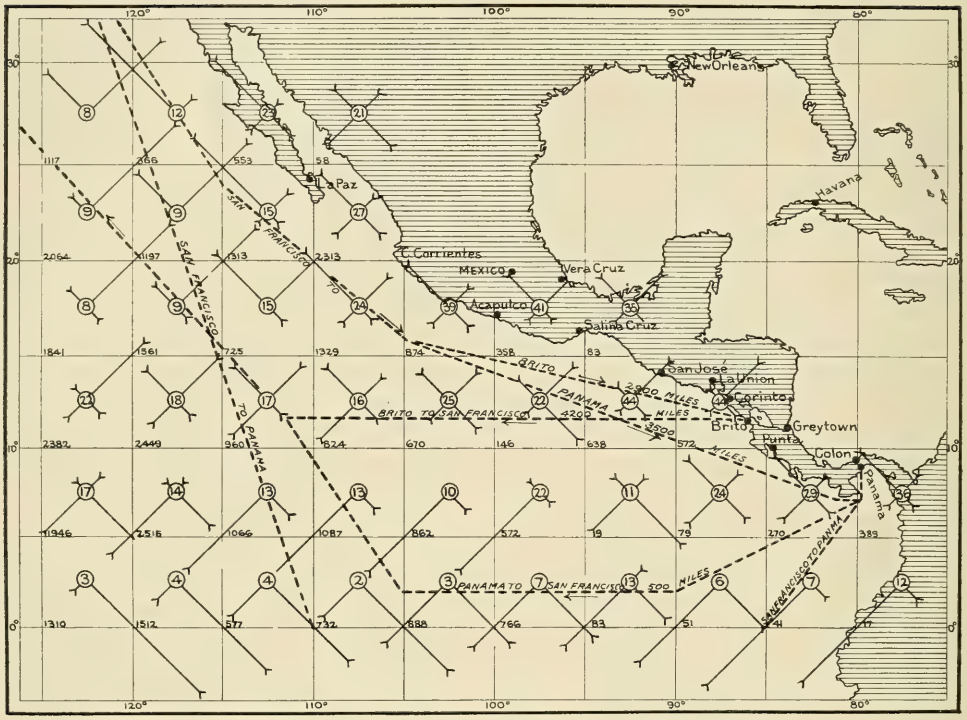
In the case of vessels bound to a European or an American port such a route will not involve any very great sacrifice of distance. For those destined to points below the equator—for example, the fleet engaged in the lumber trade from Puget Sound to South Africa, one of the most important lines of traffic still monopolized by the sailing vessel—the detour, necessitating as it does the attainment of the parallel of 35 degrees in the North Atlantic in order to circumnavigate the northeast trades, will be out of the question, and these will continue to make the passage by way of Cape Horn.

As to the feasibility of the route from Colon to the straits of Florida, it may be stated that during the wet season the passage will offer but little difficulty, the trades at this time being light in force and blowing from a point well to the eastward, or even south of east. During the dry season, however, different and decidedly adverse conditions prevail. From November to April the trades along the coast are northerly or even northwesterly in direction, and frequently attain the force of a fresh gale, requiring a close-hauled ship to reduce her canvas to reefed topsails and courses. Under these circumstances the voyage resolves itself into a steady beat to windward under most trying circumstances.

Owing to the fact that the sailing traffic of the region is at present confined to fore-and-aft schooners, it is impossible to state with accuracy the delay which a vessel of large tonnage making the passage from Colon to Cape San Antonio during the winter months would thus suffer. An analogous situation exists, however, in the case of the passage up the China Sea at the time of the northeast monsoon, and the reluctance with which this latter feat is attempted by sailing masters may be gathered from the fact that during the prevalence of this monsoon the bulk of east Asiatic trade from Europe and America follows the sailing route leading to the southward and eastward of Australia, the majority of captains claiming that such a circuit results in a saving of time over the China Sea route, although it involves the running down of at least 3,000 miles additional distance.

BELT OF CALMS AT THE PACIFIC END OF THE CANAL.

At the eastern extremity of the canal the difficulties which a sailing vessel may expect to encounter will thus arise from a superabundance of wind rather than a lack of it. At the western extremity, on the other hand, these conditions will be completely reversed.

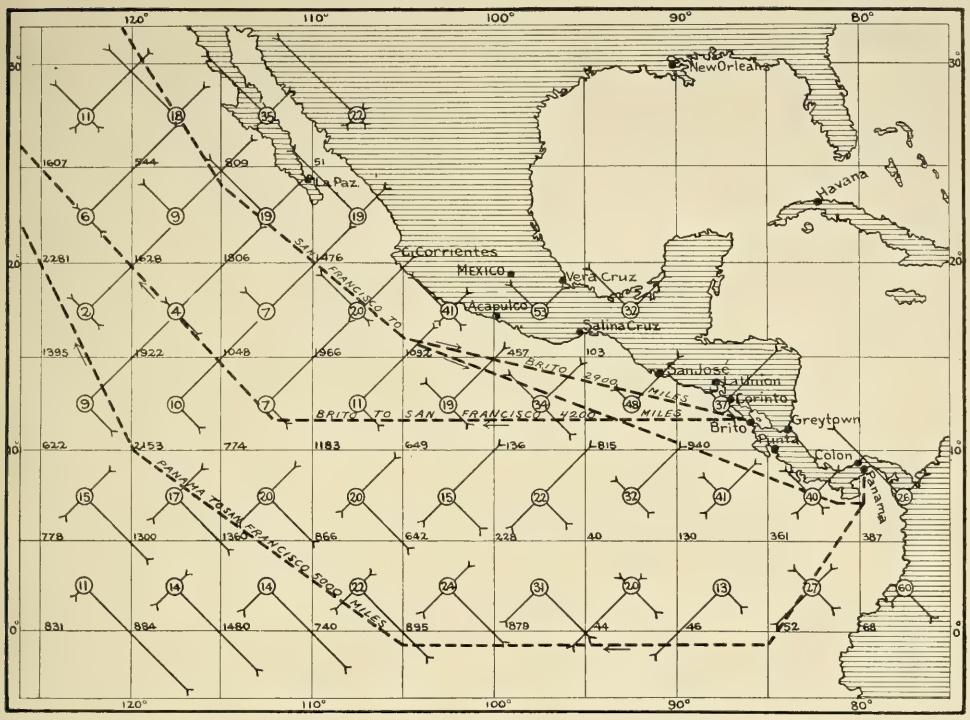


Winds, Calms, and Sailing Routes, May–October

Upon emerging from the canal into the Pacific Ocean a vessel will enter an extensive belt of calms and light airs, which render navigation by sail more tedious than in any other frequented portion of the sea.

In order to understand the feebleness of the winds throughout this region, a word is necessary as to the agency by which winds are produced. Wind is air in motion, the direction of the motion being always from an area throughout which the atmospheric pressure is high toward an area throughout which it is low, the strength of the wind at any point being within certain limits proportional to the barometric gradient or slope at that point. Where these gradients are steep the winds are strong; where they are gentle the winds are light; where they are absent, or, in other words, where the barometric pressure is uniform, the force giving rise to the winds vanishes and the air is accordingly at rest.

It is such a uniformity of pressure that exists throughout the region under consideration. Under normal conditions the distribution of atmospheric pressure over the earth's surface consists of two extratropical belts of high pressure, separated by an equatorial belt of low pressure, each of these three belts completely encircling the globe. On the equatorial slope of the high-pressure belts there is a steady movement of the air toward the low-pressure trough which separates them, this movement constituting in the northern hemisphere the northeast trades, in the southern hemisphere the southeast trades respectively. Between these two, coinciding



Winds, Calms, and Sailing Routes, November–April

roughly with the bottom of the trough which separates the high-pressure belts, lies a region known among seamen as the "Doldrums," characterized by moist, cloudy weather, absence of wind, and abundance of rain. The width of this region varies—at some points wide, at others narrow. In that portion of the North Pacific included between the American coast and the meridian of 120° W. it reaches a maximum, extending in latitude from a point one or two degrees north of the equator to Cape San Lucas, the southern extremity of Lower California. Throughout this whole region the barometric pressure is below the average and extremely uniform, ranging from 29.85 inches during the northern summer to 29 95 inches during the northern winter. Here, accordingly, barometric gradients are absent, the winds sink to stagnation, and calms prevail.

A knowledge of the general character of the winds of this region may be gathered from the following diagrams, the first holding for the northern summer, (May–October) and the second for the northern winter. The figures in the center of each five-degree square show the percentage of the time (number of hours in each hundred) during which calms or light variable airs may be expected to prevail, the length of the arrow in each quadrant, the percentage of the whole time during which the wind may be expected to blow from some point in that quadrant. The figures in the lower left hand corner give for each square the total number of observations considered. No attempt is made to show the average force of the wind, but it may in general be stated that for the entire area it does not exceed 3 on the Beaufort scale, corresponding to a ve-

locity of 15 miles per hour, and capable of imparting to a full-rigged ship sailing "full and by" a speed of from 3 to 4 knots.

THE MEXICAN BELT OF CALMS.

From an inspection of these diagrams it is evident that the "Mexican Belt of Calms," as it is known among seamen, is triangular in shape, the base of the triangle resting on the American coast, and extending from the Gulf of California to the Gulf of Panama, the vertex of the triangle lying far out in the Pacific, its longitude roughly coinciding with the meridian 125° W., near the fairway of vessels bound from San Francisco to the line. In latitude, the position of the vertex, as well as the axis of the belt, or line along which the maximum frequency of calms occurs, changes slightly with the season. From November to April its mean position is between 5° and 10° N. As the summer advances and the sun moves northward, however, the axis of the belt likewise recedes from the equator, its average position for the months May–October lying between 10°–15° north. The frequency of calms increases rapidly as the coast is approached. Immediately under the coast, however, a diminution may in some instances be noted, due to the presence of the land and sea breezes, and also to the fact that at certain points the trade wind of the Caribbean seems to reach across the Isthmus.

A REMARKABLE CASE OF POCKETING.

A single example—an extreme case, however—will serve to illustrate the delay to which a vessel may be subjected in the endeavor to navigate this dead-center of the winds. The German bark *Arcona* sailed from Punta Arenas, a point on the Isthmus somewhat to the west of Panama, December 3, 1890, bound for Hamburg. Upon leaving port light southwesterly winds were encountered, interrupted by frequent periods of calm, and with these the bark made the best of her way, on the starboard tack, to the southward. On December 10, her position at the time being latitude 6° N., longitude 84° W., the wind still holding from the southwest, the vessel went about on the opposite tack in the hope of obtaining better conditions to the westward. Thirty-two days later, or on January 11, 1891, the position was latitude 5° N., longitude 88° 40′ W., the total distance made good during the 39 days since leaving port amounting to but 350 miles. The strong northeasterly current flowing in toward the Gulf of Panama set the vessel as far back each day as the light airs carried her forward, and it was not until January 27, 55 days out, that she finally succeeded in crossing the equator in longitude 96° west.

In both approaching and in leaving Panama, irrespective of the port from which or toward which bound, a sailing vessel must of necessity navigate a greater or less width of the belt of calms just described, and in estimating for a given voyage the saving of time effected by the use of the canal the delay arising from this cause must not be neglected.

THE OCEAN HIGHWAYS OF SAILING VESSELS

As organized at present, the sailing traffic of the world is confined to certain well-beaten highways, dictated in part by the physical agency of the winds and in part by the demands of trade. Taking the English Channel and the port of New York as points of departure, the most frequent destinations are, to the westward (by way of Cape Horn), the Pacific coast ports of South, Central, and North America, and, to the eastward (by way of the Cape of Good Hope), the ports of South Africa, Australia, and Eastern Asia. Outward-bound vessels in general carry a mixed

cargo, the most important staple being case oil, which goes from New York and Philadelphia to China and Japan.

The westward-bound contingent return as they went, viz, by way of Cape Horn—those from South America laden with nitrates; those from Central America with dyewoods and ore; those from North America with lumber and grain. The eastern-bound contingent maintain their easterly progress, the large majority ultimately fetching up at one or another of the Pacific coast ports of the Union; those from Australia bringing to that coast a cargo of coal from Newcastle or Sydney; those from Hongkong, Shanghai, and Yokohama ordinarily proceeding in ballast after discharging at those ports. In Puget Sound, Portland, or San Francisco these likewise are chartered to transport lumber or grain to Europe and South Africa.

An inspection of the map will reveal the fact that the sailing highways likely to be most seriously affected by the construction of the Panama Canal, should the latter prove practicable for sailing vessels, are the present route between the Channel and the west coast of North America, outward and homeward, and the homeward route from the west coast of South America. Vessels outward-bound to the latter coast will in any event continue to round Cape Horn, inasmuch as the use of the canal by a vessel bound to a Chilean or a Peruvian port would involve upon emerging upon the Panama side a detour of several thousand miles in order to circumnavigate the southeast trades in the Pacific.

TIME SAVED FOR SAILING VESSELS BY THE PANAMA CANAL.

As to the saving of time likely to be effected by the substitution of the canal for the present route around the Horn, the figures are to some extent disappointing. The length of the voyage from the Channel to San Francisco by way of Cape Horn, following the sailing route laid down by the Deutsche Seewarte, is in the neighborhood of 16,000 miles. The average sailing time is 139 days. The return voyage, although 1,000 miles greater in distance, is made in less time, occupying but 132 days, the delay on the outward-bound passage being occasioned by the difficulty of beating around the Cape. As evidence of the importance of the traffic following this route, it may be stated that, during the year 1901–1902, 104 sailing vessels from the Channel entered at the Pacific coast ports of the United States alone, and 322 vessels cleared from these ports for the Channel.

The average sailing time from the Channel to Colon is 43 days, and from Panama to San Francisco 52 days. Allowing two days for passage through the canal, the duration of the voyage by the Isthmian route will thus amount to 97 days, as compared with 139 days by way of Cape Horn, or a net saving of 42 days. The substitution of any other Pacific coast port for San Francisco will serve only to increase or diminish the duration of both voyages to a like extent, the average sailing time to San Diego being three days less than to San Francisco, the average sailing time to Portland and Puget Sound respectively five days and seven days greater.

On the return voyage the saving in time is likely to prove considerably less. The average duration of the passage from San Francisco to Panama, as derived from the very few instances obtainable, is 55 days, while the voyage from Colon to the Channel, owing to the circuitous route which a sailing vessel is obliged to follow, occupies, under ordinary conditions, 60 days. Again adding the two days required to cross the Isthmus, the duration of the voyage from San Francisco to the Channel by way of the canal will thus prove to be 117 days, giving a saving of but

15 days as compared with the voyage by way of the Horn.

The coastwise trade between the Atlantic and the Pacific seaboard of the United States, so profitable prior to the construction of the transcontinental railways, has almost vanished from the sea, the traffic in coal alone surviving. Whether it can be revived by throwing the canal open to sailing vessels of small tonnage, coasting schooners, and the like, is a problem. The saving of time in this instance would be considerable, the duration of the voyage between New York and San Francisco by way of Cape Horn amounting to practically the same thing as the voyage from the Channel, viz, 140 days outward and 130 days homeward, while the passage from New York to Colon may be made in 20 days and the return in 28 days, giving for the total sailing time from New York to San Francisco *via* the canal 74 days, and for the return 85 days, which means a saving of 66 days and 45 days respectively.

THE NEW HOME OF THE NATIONAL GEOGRAPHIC SOCIETY

AT a meeting of the Board of Managers, March 5, Dr W J McGee, for many years past the active Vice-President of the Society, and the head of the Department of Anthropology and Archeology of the Louisiana Purchase Exposition, was unanimously elected President to succeed Dr Alexander Graham Bell, who resigned some months since in order to devote all his time to his experiments with kites. At the same meeting Mr G. K. Gilbert, Geologist of the U. S. Geological Survey, was unanimously elected Vice-President. Both Dr McGee and Mr Gilbert have been actively associated with the work of the Society since its organization in 1888. A portrait of Dr McGee was published in this Magazine in October, 1901, and of Mr Gilbert in July, 1900.

The new home of the National Geographic Society, Hubbard Memorial Hall, was formally opened on the evening of March 12. The event was observed by a reception to the members of the Society resident in Washington by Mrs Hubbard and her family, who have erected the building as a memorial to Hon. Gardiner Greene Hubbard, President of the Society from its organization until his death in December, 1897. On the first floor are offices for the Board of Managers, President, Treasurer, Secretary, and Editor. The second floor is a large room, to be used as a library, and also as a meeting place for the scientific meetings of the Society. In the basement there is a darkroom and rooms for the files of the Society. Several views of the building are shown on the succeeding pages. The cornerstone of the building was laid on April 26, 1902.*

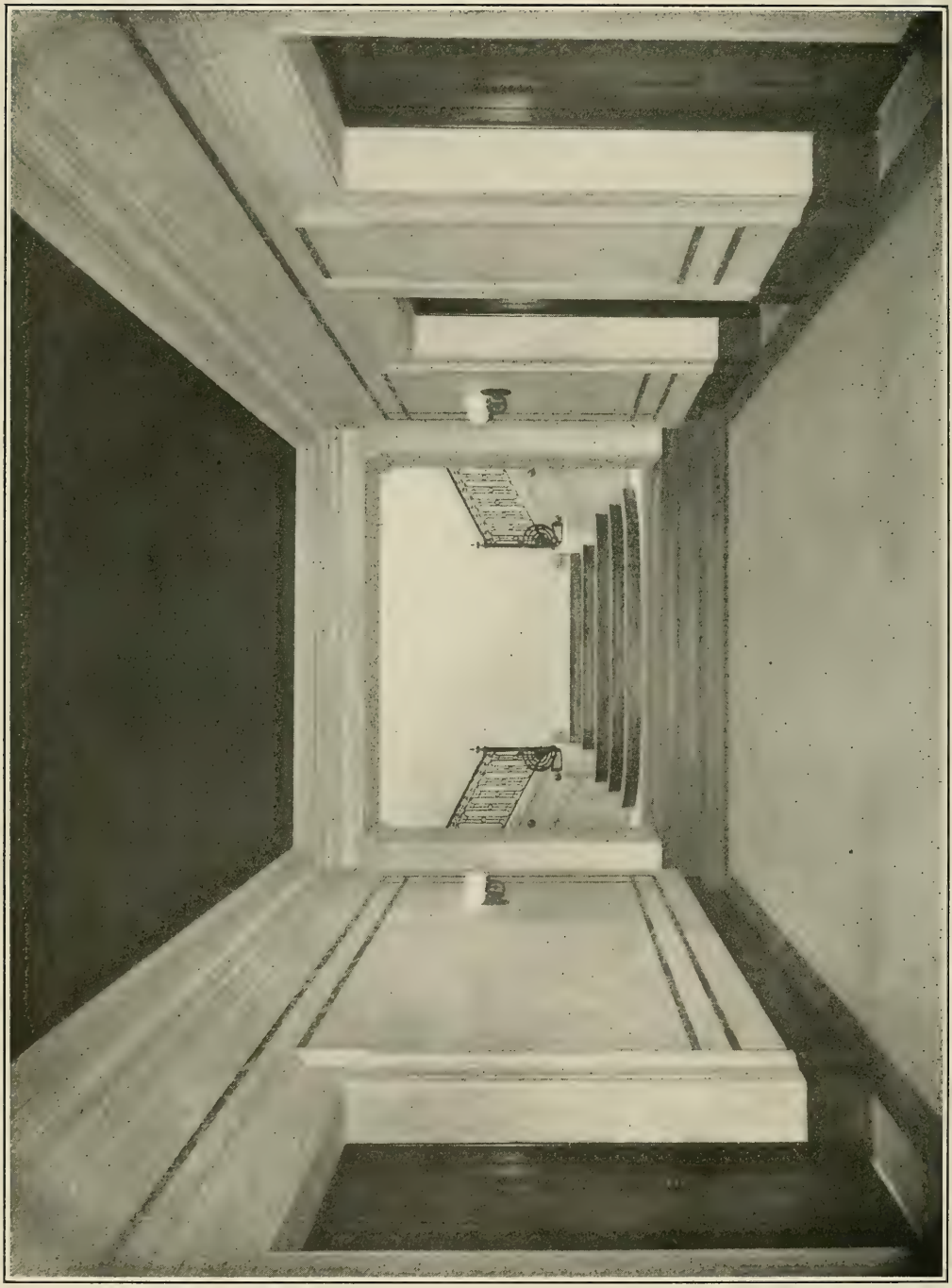
It is hoped that all members of the National Geographic Society, when they come to Washington, will visit the home of the Society and make it as far as possible their headquarters while they are in the city.

*See NATIONAL GEOGRAPHIC MAGAZINE, May, 1902, p. 174.

Photo by Leet Bros. Hornblower & Marshall, Architects

The Gardiner Greene Hubbard Memorial Hall

The home of the National Geographic Society



Hornblower & Marshall, Architects

View of Marble Entrance Hallway

Photo by Leet Bros.

Photo by Leet Bros.

The Library and Meeting Hall

Allen & Collins, Architects

Photo by Leet Bros.

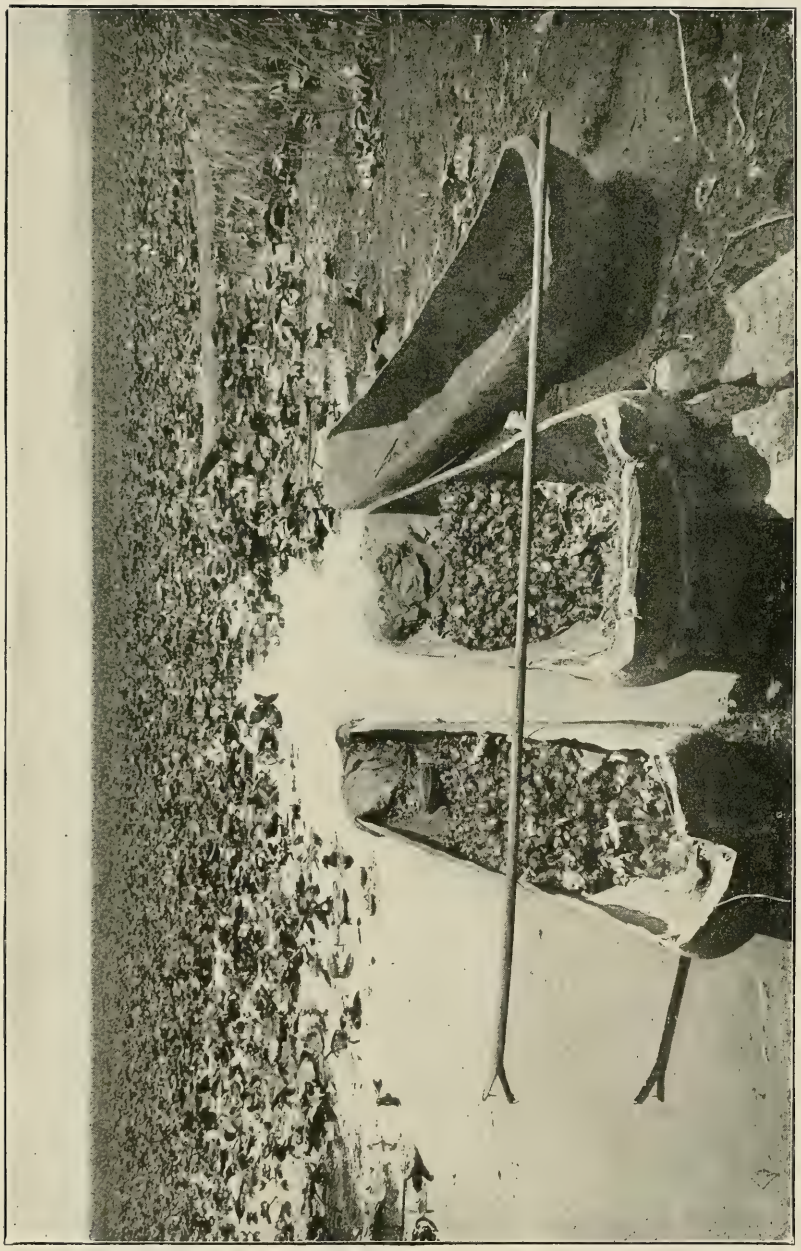
Allen & Collins, Architects

The Fireplace, Carved in Indiana Sandstone

Photo by Leet Bros.

Another View of the Library and Meeting Hall

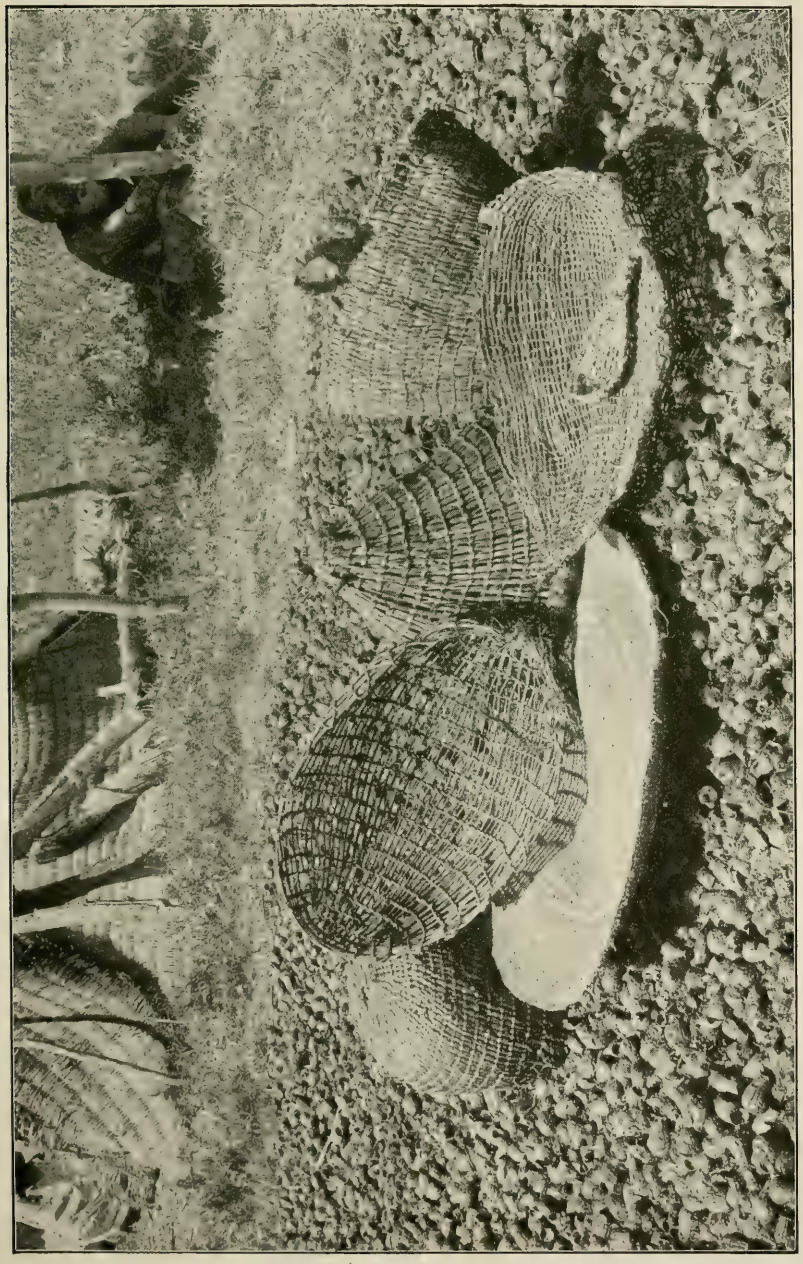
Allen & Collins, Architects



From F. V. Coville, U. S. National Museum

Ten Thousand Acres of Wokas or Waterlilies. Indian Dugouts Used for Gathering the Wokas Pods

The boat is pushed along by the pole. All the harvesting is done by the women



From F. V. Coville, U. S. National Museum

A Pile of Wokas Pods Drying in the Sun. Several Winnowing Trays and Baskets are Shown

From F. V. Coville, U. S. National Museum

Crushing the Dried Pods to Obtain the Seeds. The Seeds are in Turn Cracked or Heated to Get the Kernels

GEOGRAPHIC NOTES

WOKAS, A PRIMITIVE INDIAN FOOD

AT the foot of the Cascade Mountains, in southwestern Oregon, there is a great marsh called Klamath Marsh. In spring it is covered with beautiful yellow water lilies, which grow so vigorously as to completely exclude the usual marsh vegetation. Later in the season, when the flowers drop away and the pods form and ripen, crowds of Klamath Indians come and gather the pods or "wokas." They shell the pods in various laborious ways by drying them in the sun or over a fire, and then cracking the seed found inside the pods get a kernel, the taste of which delights the most fastidious palate. The Indians roast the kernels or make meal from them; they consider the wokas a great delicacy and hoard their seeds with much care.

In the last report of the National Museum Mr F. V. Coville gives an interesting description of the wokas and of how the Indians harvest their unique crop. He declares that the wokas are delicious when freshly parched and eaten with cream, and thinks that if some economical method of getting the seeds out of the pods could be devised it would prove a popular breakfast food. The supply will be always limited, however, to what is now growing in Klamath Marsh and in several smaller areas on the northwest coast. The lily can not be grown commercially elsewhere. In former times the wokas was a staple food of the Indians. Pictures of the wokas marsh and seeds are shown on pages 182–184.

A LABRADOR EXPEDITION

THE terrible experiences of the Leonidas Hubbard Expedition to central Labrador, ending with the tragic death of Mr Hubbard, is described in a letter from A. Dillon Wallace, a member of the expedition, to a relative in New York. The party of three—Hubbard, Wallace, and one guide—left Northwest River, Labrador, July 15, 1903, bound for Lake Michikamau, 400 miles inland. They took a scanty supply of provisions, expecting game would be plentiful; but with the exception of one caribou, which they shot, and a rare grouse or goose, they saw nothing living during the entire journey. They reached the lake September 15 in a starving condition, and found no game there either. They struggled back, with nothing to eat except straps and skins, which they soaked. Finally, on October 18, Hubbard became so weak that the party decided he must be left and the others push ahead for help. Wallace and the guide gave him almost all they had and pushed ahead, but in a few hours Wallace, too, became exhausted and unable to advance. He tried, then, to return and join Hubbard, but in his weakness lost his way. Meanwhile the guide kept on and fell in with a party of trappers. Going back they found Wallace wandering about, crazy, and Hubbard dead. Wallace has since recovered.

THE ANTARCTIC CONTINENT

THAT a vast Antarctic continent exists, perhaps twice as large as Europe, would seem to be proved by the reports now appearing of the recent explorations in that region. The American Commander Wilkes, returning from the far south in 1841, asserted the existence of a vast South Polar continent, and described his voyage of 1,500 miles in sight of the coast. Ross, however, returning soon after, discredited Wilkes' conclusions, saying that the land seen by Wilkes was merely a great wall of ice. The world has been in doubt which to believe.

That Ross was wrong and Wilkes right is very evident from the report of Captain Scott, of the British Antarctic

Expedition of 1901–1904. Captain Scott shows that the mass of ice seen by Ross is in reality an extensive glacier resting on land and covering the land like the ice cap of Greenland. The glacier is about 700 miles wide, and reaches the sea through a plain lying between Victoria Land and Edward VII Land. The German expedition under Von Drygalski, working 80 degrees of longitude farther west, also found a somewhat similar expanse of ice-capped land, whose limits they were unable to trace, but which is apparently a part of the same Antarctic continent.

THE NATURAL-GAS, OIL, AND COAL SUPPLY OF THE UNITED STATES

IT would appear from Mr F. H. Oliphant's report on the "Production of Natural Gas in 1902," published by the Geological Survey, that all the countries of the world combined produced in 1903 only about 1½ per cent as much natural gas as the United States. Our production in value amounted to $30,867,668. The reckless and appalling waste that followed the discovery of the use of the gas has been checked. The economy has come rather late, but enough of the original supply remains, stored principally in the deep and prolific sands of northern and southwestern Pennsylvania and western Virginia, to furnish the ideal household fuel for many years.

In the forty-odd years since Colonel Drake discovered petroleum on the waters of Oil Creek, near Titusville, Pa., no less than 1,165,280,727 barrels of crude petroleum had been produced to the end of 1902. That means that if 2½ feet were allowed for the height of a barrel and if these barrels, filled with all the domestic oil that has been produced, were laid so that their heads touched, they would encircle the earth 2¼ times.

Of this total production, Pennsylvania and New York produced 53.9 per cent, Ohio 24.3 per cent, West Virginia 11.3 per cent, Indiana 3.9 per cent, California 3.6 per cent, Texas 2.1 per cent, leaving .9 per cent to be supplied by the States of Kansas, Colorado, Louisiana, Illinois, Missouri, Indian Territory, Wyoming, Michigan, and Oklahoma Territory. These figures are from Mr F. H. Oliphant's report on "The Production of Petroleum in 1902."

The United States is now producing a little more than one-third of the entire coal output of the world. Her production reached 301,582,348 short tons in 1902, while Great Britain, so long the chief coal supplier of the world, produced 47,000,000 tons less, or 254,346,447 short tons, and Germany 165,826,496 tons. This estimate is from the report of the Geological Survey on "Coal in 1902," prepared by E. W. Parker.

THE DEALINGS OF THE UNITED STATES WITH THE NATIONS OF THE WORLD.

THERE is so much interest at the present time in the commercial relations of the United States with all nations that the following table, showing the extent of our dealings with the principal countries of the world, is specially useful. The table is from the Statistical Abstract of the United States, just published by the Bureau of Statistics, and gives the figures of the latest available year, 1903 in most cases.

It is interesting to observe that the exports of the United States exceed that of any other nation. Last year we sent to Russia $7,518,177 worth of goods, to Japan $21,622,603, to China $22,698,282, and received from Russia $7,262,757, from Japan $40,597,582, and from China $26,182,133. Many will be surprised to learn that the foreign trade of the Netherlands nearly equals that of France, and is surpassed only by the United States, the United Kingdom, Germany and France, being more than double that of Russia.

Table Showing Foreign Commerce of All Nations, and Trade of United States with Each Nation.

Countries.	Total imports.	Exports from United States to—	Total exports.	Imports into United States from—
	Dollars.	*Dollars.*	*Dollars.*	*Dollars.*
Argentina	99,433,000	9,808,529	173,205,000	10,396,873
Australian Commonwealth	*a* 203,644,000	28,101,784	*a* 213,713,000	*b* 13,845,001
New Zealand	*b* 55,121,000		*b* 66,403,000	
Austria-Hungary	349,283,000	6,672,580	387,526,000	10,093,346
Belgium	439,282,000	43,515,112	358,464,000	17,912,084
Bolivia	5,587,000	76,926	11,076,000	1,731
Brazil	113,288,000	11,155,565	177,323,000	71,583,086
British colonies	475,370,000	57,886,757	280,744,000	22,875,024
Bulgaria	13,751,000	.....	20,011,000	.....
Canada	224,814,000	123,472,416	213,782,000	54,660,410
Costa Rica	4,415,000	1,697,043	5,661,000	3,291,545
Guatemala	3,018,000	1,128,418	7,134,000	2,190,145
Honduras	1,672,000	969,963	2,357,000	1,136,220
Nicaragua	2,185,000	1,364,518	3,243,000	2,109,313
San Salvador	2,624,000	868,329	3,926,000	583,459
Chile	48,336,000	3,753,222	61,879,000	7,155,839
China	198,364,000	22,698,282	134,720,000	26,182,113
Colombia	10,695,000	2,923,404	18,487,000	3,140,043
Cuba	58,826,000	21,769,572	77,849,000	62,341,942
Denmark	116,714,000	14,812,900	85,733,000	68,494
Ecuador	7,029,000	1,347,850	8,811,000	1,823,166
Egypt	73,229,000	667,577	87,081,000	10,854,628
Finland	45,197,000	(*c*)	38,717,000	(*c*)
France	848,046,000	70,497,327	820,671,000	87,895,253
Algeria	64,228,000	*d* 386,758	60,804,000	*d* 461,102
Tunis	12,483,000		7,551,000	
French colonies	46,808,000	2,785,418	35,806,000	1,088,493
French East Indies	41,964,000	62,361	40,677,000	3,873
German Empire	1,340,178,000	174,264,495	1,113,313,000	111,999,904
German colonies	8,969,000	30,949	4,497,000	11,702
Greece	26,034,000	369,919	15,466,000	1,229,144
Haiti	5,500,000	1,956,343	12,760,000	1,127,641
India, British	255,614,000	4,866,683	408,396,000	51,831,665
Italy	342,718,000	33,135,512	284,177,000	33,612,864
Japan	135,322,000	21,622,603	127,326,000	40,597,582
Formosa	5,030,000		6,881,000	
Korea	6,744,000	257,130	4,142,000	.....
Mexico	74,687,000	42,227,786	88,200,000	*b* 61,802,902
Netherlands	867,308,000	74,576,164	732,975,000	20,899,588
Dutch East Indies	86,894,000	2,210,963	98,724,000	15,343,948
Norway	78,869,000	(*e*)	45,147,000	(*e*)
Paraguay	2,270,000	14,815	3,787,000	3,890
Persia	23,703,000	.....	13,243,000	.....
Peru	21,062,000	2,573,289	17,938,000	2,826,493
Portugal	60,044,000	2,915,897	30,709,000	3,229,813
Roumania	54,686,000	138,635	72,340,000	65
Russia	305,614,000	7,518,177	392,215,000	7,262,757
Santo Domingo	2,987,000	1,700,371	5,224,000	3,361,319
Servia	8,650,000	.....	13,920,000	33,149
Siam	16,515,000	.....	22,065,000	.....
Spain	175,499,000	15,976,788	154,164,000	8,787,621
Sweden	134,603,000	9,530,137	105,154,000	4,193,307
Switzerland	217,803,000	203,357	168,741,000	19,864,767
Turkey	117,134,000	354,457	59,072,000	2,359,830
United Kingdom	2,571,416,000	523,773,397	1,379,283,000	180,249,114
United States	1,025,719,000	.....	1,392,231,000	.....
Philippine Islands	32,972,000	4,038,909	33,122,000	11,372,584
Uruguay	24,565,000	1,549,812	33,656,000	2,830,069
Venezuela	8,458,000	2,736,726	17,962,000	6,609,919
Total	11,602,973,000	1,356,965,925	10,260,184,000	1,003,224,820

a Exclusive of intercolonial commerce, but including gold and silver. *b* Including gold and silver. *c* Included under Russia. *d* French Africa. *e* Included under Sweden.

Indian Baskets. The main feature of the report of the National Museum for 1902 is a remarkable monograph on Aboriginal American Basketry by Otis T. Mason. The paper is illustrated by 250 full-page plates, many of them colored, and by 212 figures in the text. The colored plates are particularly beautiful and well printed. "Basketry and pottery are the sibylline leaves on which are written the thoughts and lore of our Indians." The report is particularly important, as it is the first expert and comprehensive description of Indian basketry published.

The Mining Year Book of the U. S. Geological Survey is nearly ready for distribution. It is entitled "Contributions to Economic Geology, 1903," and was prepared under the supervision of Messrs C. W. Hayes and S. F. Emmons. The volume contains 50 short articles by thirty of the Survey's best-known geologists on the year's developments in various mining interests of the United States and Alaska—gold, silver, copper, coal, tin, oil, etc.

Commercial Korea in 1904 is the title of a monograph issued by the Department of Commerce and Labor through its Bureau of Statistics. It discusses commercial and other condltions in Korea, showing area, population, transportation facilities, railways, telegraphs, postal service, and foreign commerce.

Commercial China in 1904, published by the Bureau of Statistics, contains a vast amount of useful information about the Chinese Empire—treaties, railways and waterways, population, resources, recent development, etc.

A memorial to Professor Joseph Le Conte has been constructed by the Sierra Club of San Francisco in the Yosemite Valley at a cost of $8,000. It is a building of granite, erected under the walls of Glacier Point. The building is divided into three parts, the main room measuring 28 by 38 feet. Above the main room a Gothic roof rises to the height of 35 feet. Inside are a large reading table, wall seats, and a large bookcase in which are kept books and papers pertaining to travel and research and maps and papers furnished by the Sierra Club.

Map of Alaska. THE NATIONAL GEOGRAPHIC MAGAZINE in its May number will publish a map of Alaska, 42 x 36 inches. The map was prepared by the U. S. Geological Survey and shows the latest surveys and explorations. It is in three colors and should prove extremely useful to all who are interested in the rapid development of the territory. The map will be supplemented by an article by Mr Alfred H. Brooks, Chief of the Alaskan Division of the Geological Survey.

TOPOGRAPHIC SHEETS RECENTLY PUBLISHED BY THE U. S. GEOLOGICAL SURVEY

California: The Tejon and Yosemite quadrangles.

Indiana: New Harmony and Haubstadt quadrangles

Kansas: Iola quadrangle.

Maine: The Blue Hill quadrangle.

Maryland: Baltimore and vicinity.

Montana: The Saypo, Browning, and Coopers Lake quadrangles.

North Carolina: The Newberne and Tarboro quadrangles.

Ohio: Maps of fourteen quadrangles—the Bowling Green, Elmore, Fremont, Vermilion, Euclid, Cleveland, Wooster, Dublin, Delaware, Canton, Massillon, Fostoria, and Oberlin.

Texas: The Polvo and Terlingua quadrangles

Utah: Hayden Peak quadrangle.

The maps, as a rule, are named after the most important town in the district covered. The maps may be purchased of the Survey for 5 cents each

"Geographic Tables and Formulas" (Bull No. 214), recently published by the Geological Survey, includes all tables and formulas used by topographers in the field and office. The tables were compiled by S. S. Gannett and the material revised by E. M. Douglas and H. L. Baldwin.

GEOGRAPHIC LITERATURE

Korea. By Angus Hamilton. With map and illustrations. Pp. xliii + 313. 5½ by 8 inches. New York. Chas. Scribner's Sons. 1904. $1.50 *net.*

This is an exceedingly clear and able description of the Koreans and their country and of the political and commercial problems of which Korea is the cause. Mr Hamilton defines the people as follows:

"The Koreans are an agricultural people, and most of the national industries are connected with agriculture. More than seventy per cent of the population are farmers. . . .

"The peaceable, plodding farmer of Korea has his counterpart in his bull. The Korean peasant and his weary bull are made for one another. Without his ruminating partner, the work would be impracticable. It drags the heavy plough through the deep mud of the rice fields, and over the rough surface of the grain lands; it carries loads of brick and wood to the market, and hauls the unwieldy market cart along the country roads. The two make a magnificent pair; each is a beast of burden.

"They submit to oppression and to the cruelty of the Yamen; they endure every form of illegal taxation, and they ruin themselves to pay 'squeezes,' which exist only through their own humility. . . .

"At the present date the farmer of Korea is the ideal child of nature; superstitious, simple, patient, and ignorant. . . .

"To the wayfarer and stranger the individual farmer is supremely and surprisingly hospitable. A foreigner discussing the peculiarities of their scenery, their lands, and the general details of their life with them, is struck by their profound reverence for everything beyond their own understanding, and their amazing sense of the beautiful in nature.

"The Korean is omnivorous. Birds of the air, beasts of the field, and fish from the sea, nothing comes amiss to his palate. Dog-meat is in great request at certain seasons; pork and beef with the blood undrained from the carcase, fowls and game—birds cooked with the lights, giblets, head and claws intact, fish, sun-dried and highly malodorous, all are acceptable to him.

"Their excesses make them martyrs to indigestion."

A Handbook of Modern Japan. By Ernest W. Clement. With maps and illustrations. Pp. 395. 5 by 7½ inches. Chicago: A. C. McClurg & Co. 1904. $1.50.

Mr Clement, who has lived for 15 years in Japan, has collected in his handbook exactly the information regarding that nation sought by every one at the present time. His aim has been to portray Japan in all its features as a modern world power. The descriptions are concise and effective. There are admirable chapters on the Physiography, History, Local Self-government, Japan as a World Power, Japanese Christendom, and the Mission of Japan. An excellent feature is a bibliography of reference books at the end of each chapter, while in the appendix are numerous tables giving interesting statistics. One of these shows that the ratio of cultivated land to the total area of the country is only 13.8 per cent; in Belgium the ratio is 53.9; in Prussia, 50.3; in France, 50.2; in England, 27.9. The volume is well illustrated with pictures of important persons and scenes.

BOOKS RECEIVED

Greater Russia. By Wirt Gerrare. Illustrated. Pp. 337. 6 by 9 inches. New York: The MacMillan Co. 1904. $3.00.

Birds of California. By Irene Grosvenor Wheelock. Illustrated. Pp. xxviii + 578. 5½ by 7½ inches. Chicago: A. C. McClurg & Co. 1904. $1.50.

Steps in the Expansion of Our Territory. By Oscar P. Austin. With 33 maps. Pp. 258. 5 by 7½ inches. New York: D Appleton & Co. 1903. $1.25 *net.*

In Famine Land. By J. E. Scott. Illustrated. Pp. 206. 5½ by 8½ inches. New York: Harper & Bros. 1904.

Geology. By Thomas C. Chamberlin and Rollin D. Salisbury. In two volumes. Volume I. Geologic Processes and their Results. Illustrated with plates and diagrams. Pp. xix + 654. 6 by 8½ inches. New York: Henry Holt & Co. 1904.

Nebraska Geological Survey. By State Geologist Erwin H. Barbour. Volume I. Illustrated. Pp. 258. 7 by 10 inches. Lincoln, Neb. 1903.

A Journey to Lhasa and Central Tibet. By Sarat Chandra Das. Edited by W. W. Rockhill. Illustrated. Pp. x + 285. 5½ by 8½ inches. New York: E. P. Dutton & Co. 1902. $3.50 *net.*

Letters from a Chinese Official. Pp. 75. 5 by 7 inches. New York: McClure, Phillips & Co. 1904.

Alaska. Edited by C. Hart Merriam. Illustrated. Volume III. Glaciers and Glaciation. By Grove Karl Gilbert. Pp. xii + 232. 10½ by 7 inches. Volume IV. Geology and Paleontology. By B. K. Emerson, Charles Palache, William H. Dall, E. O. Elrich, and F. H. Knowlton. Pp. 173. New York: Doubleday, Page & Co. 1904. $10.00.

Field and Laboratory Exercises in Physical Geography. By James F. Chamberlain. Pp. 127. 8 by 10 inches. New York: American Book Company. 1904.

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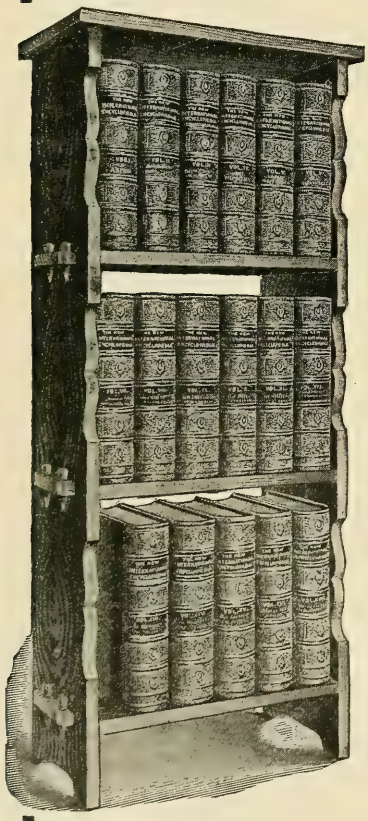

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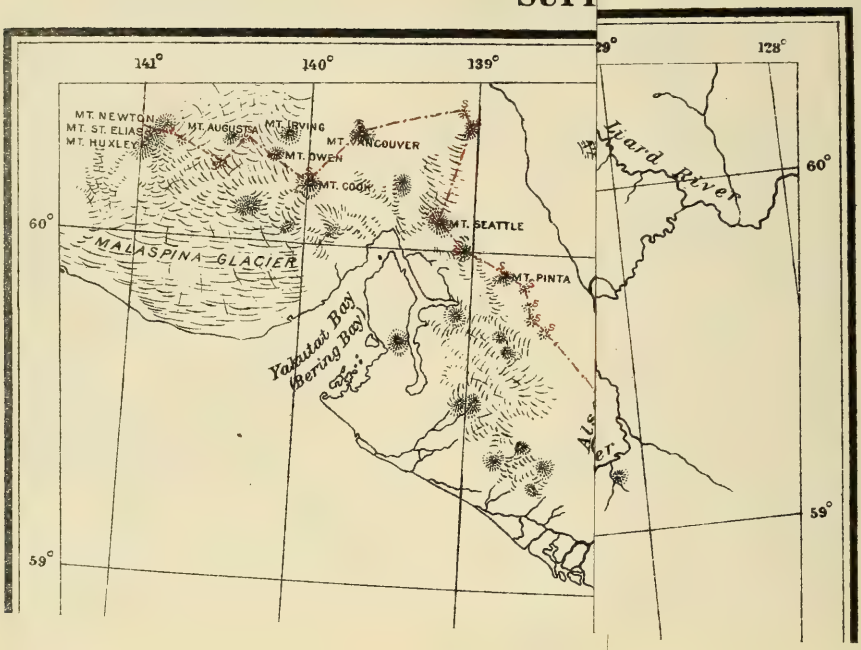
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59°

Vol. XV, No. 5 WASHINGTON May, 1904

THE NATIONAL GEOGRAPHIC MAGAZINE

THE BUREAU OF FISHERIES*

HOW THE RICH FISHERIES OF THE UNITED STATES ARE PROTECTED AND NEW FISHING GROUNDS DISCOVERED OR CREATED

By Dr Barton Warren Evermann

Assistant in Charge, Division of Scientific Inquiry, Bureau of Fisheries

In order that we may understand clearly the purposes, scope, and methods of the Bureau of Fisheries, it will be helpful to recall briefly the circumstances leading up to and attending its inception. In 1870 committees of the legislatures of Massachusetts and Rhode Island and the State Fish Commissions of Connecticut, Vermont, and New Hampshire made inquiries concerning the reported decrease in the abundance of certain species of important food-fishes and the cause of the decrease, if such had occurred. The Massachusetts committee found that there had been no real decrease. The Rhode Island committee, with practically the same evidence, concluded that there had been a serious decrease, but were not agreed as to the cause. New Hampshire and Vermont were sure that the shad and salmon fisheries were being depleted, and attributed it to the use of traps in and about the mouth of the Connecticut River. Connecticut was willing to abolish traps if Massachusetts would put in fishways at all the dams on the Connecticut River in that State and if New Hampshire and Vermont would furnish sufficient quantities of salmon and shad fry for restocking the river. Vermont, New Hampshire, and Massachusetts failed to keep the agreement and Connecticut soon began licensing traps.

So diverse were the opinions expressed by different fishermen and the conclusions reached by the different state committees that it became at once apparent that the actual facts could be determined only through very careful investigation.

In view of these facts, it was thought that the condition of the fisheries should receive investigation by the federal government, and the following bill was introduced in the House of Representatives by the Hon. Henry L. Dawes, of Massachusetts.

* An address before the National Geographic Society Friday evening, February 12, 1904

"Whereas it is asserted that the most valuable food-fishes of the coast and the lakes of the United States are rapidly diminishing in number, to the public injury, and so as materially to affect the interests of trade and commerce: Therefore,

"*Be it resolved by the Senate and House of Representatives of the United States of America in Congress assembled*, That the President be, and he hereby is, authorized and required to appoint, by and with the advice and consent of the Senate, from among the civil officers or employés of the government, one person of proved scientific and practical acquaintance with the fishes of the coast, to be Commissioner of Fish and Fisheries, to serve without additional salary.

"SEC. 2. *And be it further resolved*, That it shall be the duty of said Commissioner to prosecute investigations and inquiries on the subject, with the view of ascertaining whether any and what diminution in the number of the food-fishes of the coast and the lakes of the United States has taken place; and, if so, to what causes the same is due; and also whether any and what protective, prohibitory, or precautionary measures should be adopted in the premises; and to report upon the same to Congress."

This bill became a law February 9, 1871, and President Grant appointed as Commissioner of Fish and Fisheries Professor Spencer F. Baird, then Assistant Secretary of the Smithsonian Institution. The new position carried no salary, but Professor Baird was willing to perform the duties of the new office, in addition to those of Assistant Secretary of the Smithsonian Institution, without additional salary.

Early in June, 1871, Professor Baird established his headquarters at Woods Hole, Massachusetts, this being in the region where the alleged decrease was most clearly manifested, and entered upon the investigations for which the Commission had been created.

The contradictory opinions developed by the state inquiries regarding the habits of our best known food-fishes showed at once that the fishermen could not be depended upon for accurate observations or expression of unbiased opinion. It was necessary therefore that the habits or life-histories of the important food-fishes should receive thorough study before satisfactory conclusions could be reached. With the able assistance of Dr Theodore Gill, a definite and comprehensive plan of inquiry was formulated. Professor Baird's training as a naturalist, as well as his tastes, gave him faith in the exact methods of science in the investigation of all economic questions; and it was the scientific method which characterized the very first inquiries undertaken by the Commission. The methods to be pursued were those of science, and the Fish Commission therefore began its career as a scientific bureau.

It soon became evident that the fisheries had greatly decreased in value, and that destructive methods—overfishing, the building of dams and other obstructions in coastwise streams, and the pollution of their waters by refuse from sawmills and other manufactories—were among the most potent causes which had led to the decrease.

The only adequate solution of the problem seemed to be the establishment of proper fishery regulations based upon accurate knowledge of the habits of the fishes, and the development of methods of artificial propagation as applied to those species in danger of most serious depletion. The initial efforts of the Commission were therefore directed, first, toward securing accurate knowledge of the habits, abundance, and distribution of the more important species of food-fishes, and, second, the development of methods by means of which these species might be propagated artificially.

This Bureau was established as the United States Commission of Fish and Fisheries, and the chief of the Bureau was known as the United States Commissioner of Fish and Fisheries. The Commission remained as an unattached bureau, not being placed in any Cabinet department, until the establishment of the Department of Commerce and Labor.

On the 1st of July, 1903, the Commission was transferred to that department and the name was changed to "Bureau of Fisheries." Professor Baird served as Commissioner from the organization of the Commission until his death, in 1887. Dr G. Brown Goode was then appointed Commissioner, but agreed to serve only until a salary could be attached to the position, as he preferred to give his energies to the development of the United States National Museum. The Congress attached a salary to the Commissionership early in 1888, when Dr Goode resigned and Col. Marshall McDonald was appointed Commissioner. Colonel McDonald had for many years been one of the most energetic and capable assistants in the Commission. He served as Commissioner until his death, in 1895, when Capt. John J. Brice, U. S. N., retired, was appointed Commissioner. He served until February, 1898, when he was superseded by the present Commissioner, Hon. George M. Bowers, who has continued the wise and liberal policy of Baird and McDonald, and under his administration the scientific and economic results are constantly increasing in importance and value.

Dragging the Surface and Dip Nets from the *Albatross*

Although the Commission was originally established simply to inquire into the condition of the fisheries of the sea-

coast and lakes, the matter of the actual increase of the food-fishes by means of artificial propagation was added in the second year of its existence, thus establishing a twofold function. The beginnings of the Fish Commission were very modest. The appropriations made by Congress were small in amount, and the personnel at first consisted of but one man, and he without salary. But as the importance and possibilities of the work came to be more keenly appreciated, the scope of the Commission increased and the work became differentiated into a number of divisions.

PRESENT ORGANIZATION OF THE BUREAU

For purposes of administration the work of the Bureau of Fisheries is conducted by and through the following offices and divisions:

1. *Administration*, consisting of the Commissioner's office, that of the Deputy Commissioner, the chief clerk, engineer and architect, library, disbursing office, and the necessary clerical force.

The duties of the Commissioner, as chief of the Bureau, have already been sufficiently defined. Those of the Deputy Commissioner, chief clerk, and disbursing officer are sufficiently defined by the appellations. The engineer and architect is charged with all matters pertaining to planning and constructing the various fish-cultural stations. This includes the selection of hatchery sites in so far as engineering problems are concerned, the designing and construction of hatchery buildings, superintendents' residences, and all other necessary buildings, the laying out and construction of the necessary ponds, fishways, dams, and flumes, and all other matters of construction and civil and mechanical engineering.

2. DIVISION OF INQUIRY RESPECTING FOOD-FISHES

This division is usually known as the Division of Scientific Inquiry. The assistant in charge is charged with the apportionment and direction of all the research work of the Bureau. He gives consideration to the various lines of scientific investigation which are proposed or which the Bureau might undertake, determines or approves the methods and means to be employed, and recommends them to the Commissioner, coördinates and directs all research work of the Bureau, and examines all reports of investigations, whether carried on by the regular staff or by employés selected temporarily for special inquiries.

To this division belong all investigations and researches pertaining to the physical and chemical characteristics of the waters of the United States, including the seas as well as the lakes, rivers, and smaller streams, in so far as these are factors in determining the character of aquatic life; the life histories, habits, food, enemies, abundance, and distribution of food-fishes and other aquatic animals and of aquatic plants, whether of the lakes and rivers or of the seas. It makes inquiries into the causes of decrease of food-fishes, wherever found, studies the various species and the various regions in the interests of fish-culture, makes the biological investigations necessary for the proper selection of sites for fish-cultural stations, and investigates the fishing grounds of the Atlantic, Gulf, and Pacific coasts, as well as those of the interior waters and our island possessions, in the interests of fish-culture and the commercial fisheries.

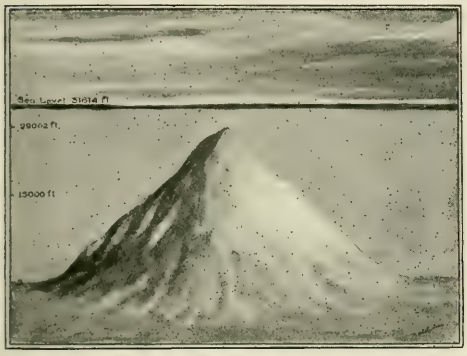
A few of the more important lines of inquiry may be mentioned in detail:

1. *On the Coasts and the High Seas.*—Besides a number of smaller vessels such as the *Bluewing*, *Phalarope*, and *Merganser*, the Bureau has 3 vessels of larger size. These are the *Albatross*, *Fish Hawk*, and *Grampus*.

The *Albatross* is an iron twin-screw steamer 234 feet long, 27 feet 6 inches beam, and 1,074 tons displacement. She was built at Wilmington, Delaware, at

a cost of $190,800, including outfit and special equipment. She was launched August 19, 1882, and went into commission November 11 following, with Lieutenant (now Commander, U. S. N., retired) Z. L. Tanner as commanding officer. Captain Tanner had superintended the construction of the vessel and was its able and efficient commander for nearly 12 years. To Captain Tanner more than to any other one man is due the credit for the great scientific and economic results of the investigations made by the *Albatross*.

The *Albatross* was built expressly for use in investigating questions connected



Picture of the Highest Mountain in the World Set in the Greatest Ocean Depth

If Mt Everest (29,002 feet) were set down in the Nero Deep (31,614 feet) there would still be nearly one-half mile of water above its summit.

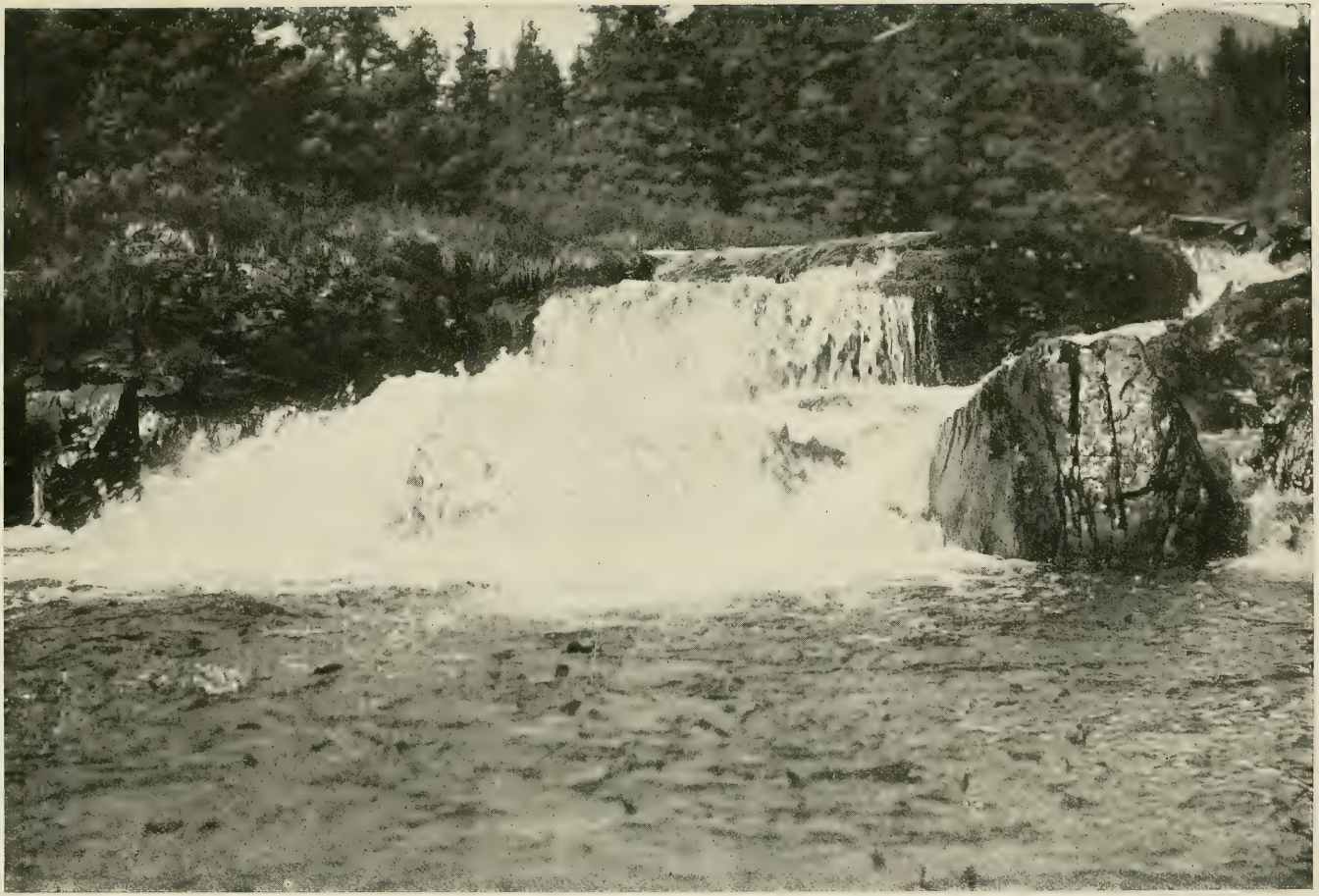
with the high seas, such as ocean temperatures, densities, depths, currents, character of bottom and distribution of life; the movements of pelagic and anadromous fishes as well as others which go in schools; the location, extent, and character of off-shore fishing banks; for all these matters have bearing upon the commercial fisheries.

The vessel is admirably adapted to the purposes for which she was designed. There are comfortable rooms for the naturalists and other members of the civilian staff, and 2 laboratories well equipped with reagents, preservatives, and appropriate scientific literature, where the collections may be cared for and scientific studies carried on. The vessel is electric-lighted throughout, has distilling and cold storage plants, photographic dark-room, search-light, and special search-lights for submarine use, which the *Albatross* was the first to use. The *Albatross* was the first vessel ever built expressly for scientific work along biologic lines on the high seas, and is certainly the best equipped vessel in the world for that purpose. She is officered and manned from the United States Navy, but has a civilian staff consisting of a chief naturalist, an assistant naturalist, a fishery expert, photographer, and, on special cruises, experts in hydrography, thalassography, and other lines.

The *Albatross* has been principally engaged in developing the resources naturally existing along our coasts, and the fishing grounds which are unknown or little known to our fishermen. In doing this the bottom over very wide areas must be examined with great detail. Lines of soundings must be run at close intervals to determine the depth; samples of the bottom must be secured, and temperature and density observations made; and the dredge, beam-trawl, and tangle used to determine the character and abundance of the fishes and other life forms.

It is impracticable to enumerate in this connection the various investigations upon which the *Albatross* has been engaged. During the five years (1882 to 1887) when she was on the Atlantic coast she conducted important inquiries along the entire length of the coast from Maine to Florida, in the Caribbean Sea, Gulf of Mexico, off Newfoundland and Nova Scotia, and in the Bahamas.

In November, 1887, she left Hampton Roads for the Pacific, where she has ev-



Cascades in Litnik Stream—Afognak Island, Alaska. Many Humpback Salmon are Seen Jumping in the Pool. One Large Fish is Struggling in the Falls

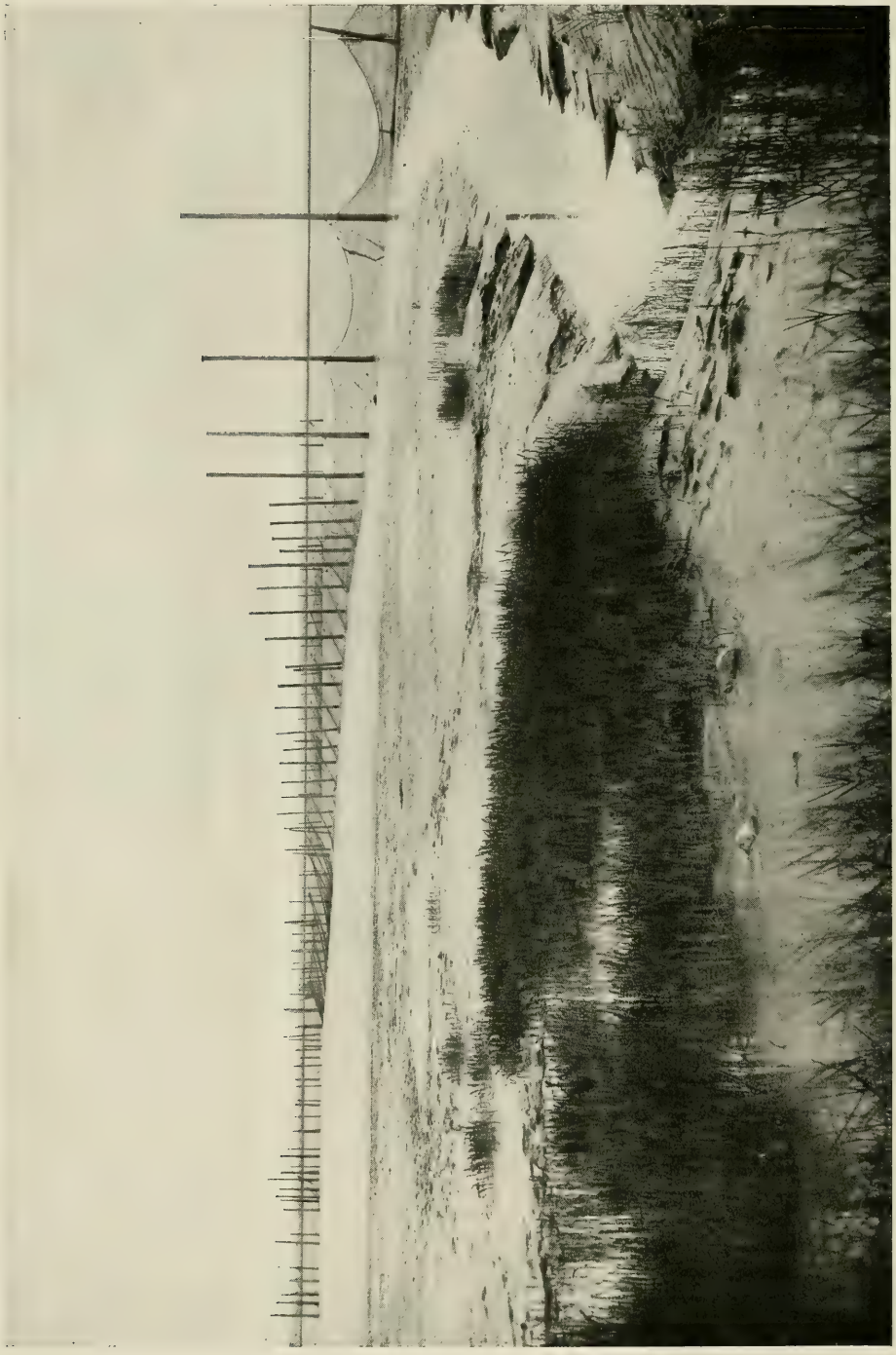
The salmon output of Alaska for 1903 is valued at $10,000,000, which exceeds by more than two and one-half million dollars the amount which Alaska cost us. If we add to the salmon the value of the cod, halibut, and other fisheries of Alaska, the total greatly exceeds all the other developed resources of Alaska combined.

A Salmon Ascending the Cascades of Litnik Stream. (See illustration on opposite page)

since remained. On her long voyage round the Horn many sounding and dredging stations were made and valuable collections obtained.

NOTED ACHIEVEMENTS OF THE ALBATROSS

During the sixteen years that the *Albatross* has been in the Pacific she has been as actively engaged in important work as the available funds would permit. Among the most notable investigations may be mentioned the development of important fishing grounds in the Gulf of California, on the coast of California off San Diego, Santa Barbara, and San Francisco, also off the Straits of Fuca and Vancouver Island; the discovery and development of rich cod and halibut grounds in the northern Pacific and Bering Sea; the study of the salmon fisheries of Alaska, and the fishes and other aquatic resources of the Hawaiian Islands. From 1891 to 1897 she was engaged for a portion of each year in investigations in connection with the various fur seal commissions. In the winter of 1891 and '92 she made, under the direction of the Secretary of the Navy, a survey for a cable from San Francisco to Honolulu. During the early months of 1891 and again in 1899



Salmon Trap Belonging to Alaska Packers' Association, Nushagok River

and 1900 the *Albatross* was put under the direction of Professor Alexander Agassiz, who carried on very extensive investigations off the Pacific coasts of Mexico, Central America, and South America, about the Galapagos Islands, and in the South Pacific. During last summer and fall she was placed in charge of the Alaska Salmon Commission for the study of the Alaska salmon fisheries; and now she is just entering on a comprehensive and thorough physical and biological survey of San Diego and Monterey bays.

THE GREATEST DEPTHS WHERE LIFE HAS BEEN FOUND

While carrying on her work the *Albatross* has made more than 10,000 soundings, and more than 4,000 dredgings, and has brought up from the bottom of the sea hundreds of tons of fishes and other animals and mud.

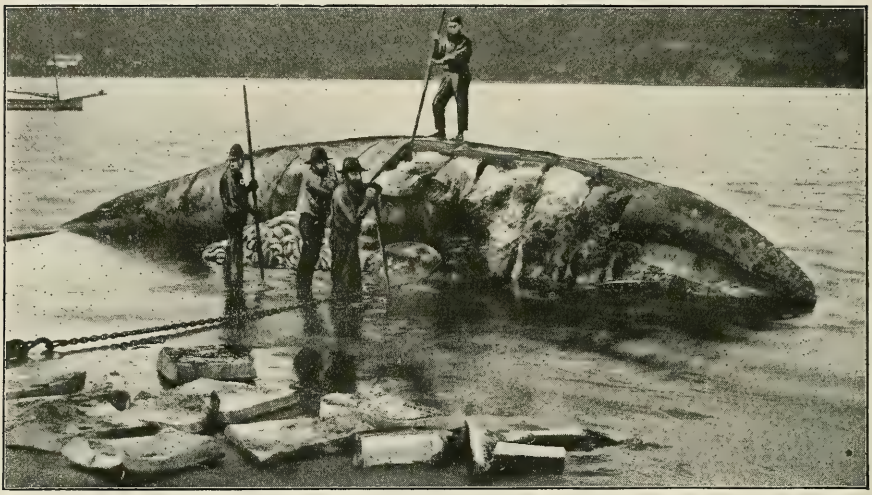
The greatest depth from which the *Albatross* has secured any life was 4,173 fathoms. This was in the South Pacific between Tonga and Ellice Islands. The dredge brought up silicious sponges, radiolarians, and brown volcanic mud. The greatest depth from which she has brought up fishes is 2,949 fathoms, or about 3⅓ miles. This was in the edge of the Gulf Stream off the coast of Virginia. The deepest sounding ever made by the *Albatross* was at Station 4010, near Guam, where the enormous depth of 4,813 fathoms, or nearly 5½ miles, was found.

The deepest sounding ever made by any vessel was by the U. S. S. *Nero* while on the Honolulu-Manila cable survey, with apparatus borrowed from the *Albatross*. When near Guam the *Nero* got 5,269 fathoms, or 31,614 feet, only 66 feet less than 6 miles. If Mount Everest, the highest mountain on earth, were set down in this hole, it would have above its summit a depth of 2,612 feet, or nearly half a mile of water.

The deep-sea collections of the *Albatross* from time to time have been assigned to specialists throughout the world for study and report. They have been marvelously rich in new and interesting species. About 100 new genera and more than 2,500 new species have been based on the collections of the *Albatross*. The results of the investigations of the *Albatross* have been published in more than 275 separate articles and reports which have appeared chiefly in the publications of the United States Fish Commission, the United States National Museum, and the Museum of Comparative Zoölogy.

The *Fish Hawk*, another steamer belonging to the Bureau, was built in 1880. This is a vessel of 484 tons, 156½ feet long over all, 27 feet beam, and was constructed expressly for the Fish Commission "to serve as a floating hatching-house for the production of shad, herring, striped bass, etc., and capable of being moved to any place where the breeding fish can be found." The *Fish Hawk* is also equipped for cod and mackerel hatching and for scientific investigation in the bays and sounds and other coastal waters. Every spring she is engaged in hatching shad and other species on the Atlantic coast at various stations from Florida to Maine. Besides this she has done a vast amount of dredging in connection with the survey and study of the oyster beds and fishing grounds of the Atlantic and Gulf coasts. In the winter of 1898 and '99 the *Fish Hawk* made an investigation of the aquatic resources of Porto Rico which yielded very important economic and scientific results.

The *Grampus*, the third of the larger vessels of the Bureau, was built in 1886. This is a two-masted schooner, 90 feet long over all, 22 feet 2 inches beam, and 83.3 tons displacement. The *Grampus* was constructed for a number of purposes. Being built with a live-well, fishes and other marine animals can be brought to the hatching or the



Removing Blubber from a Whale Beached on California Coast

This and the following views illustrate different phases of the American fishing and oil industries which are being studied by the Bureau of Fisheries. The illustration and the illustrations on pages 201, 202, 204 are from Charles H. Stevenson's admirable report, "Aquatic Products in Arts and Industries."

biological stations, thus affording an opportunity to study their habits and development. The vessel has also been useful in testing various fishing gear, such as the beam-trawl, in a commercial way, in following the schools of fishes and developing off-shore fishing grounds.

2. *Investigation of Interior Waters.*— One of the principal lines of work carried on by the Division of Scientific Inquiry is a study of the rivers and lakes of the United States with reference to the physical and biological characteristics of each.

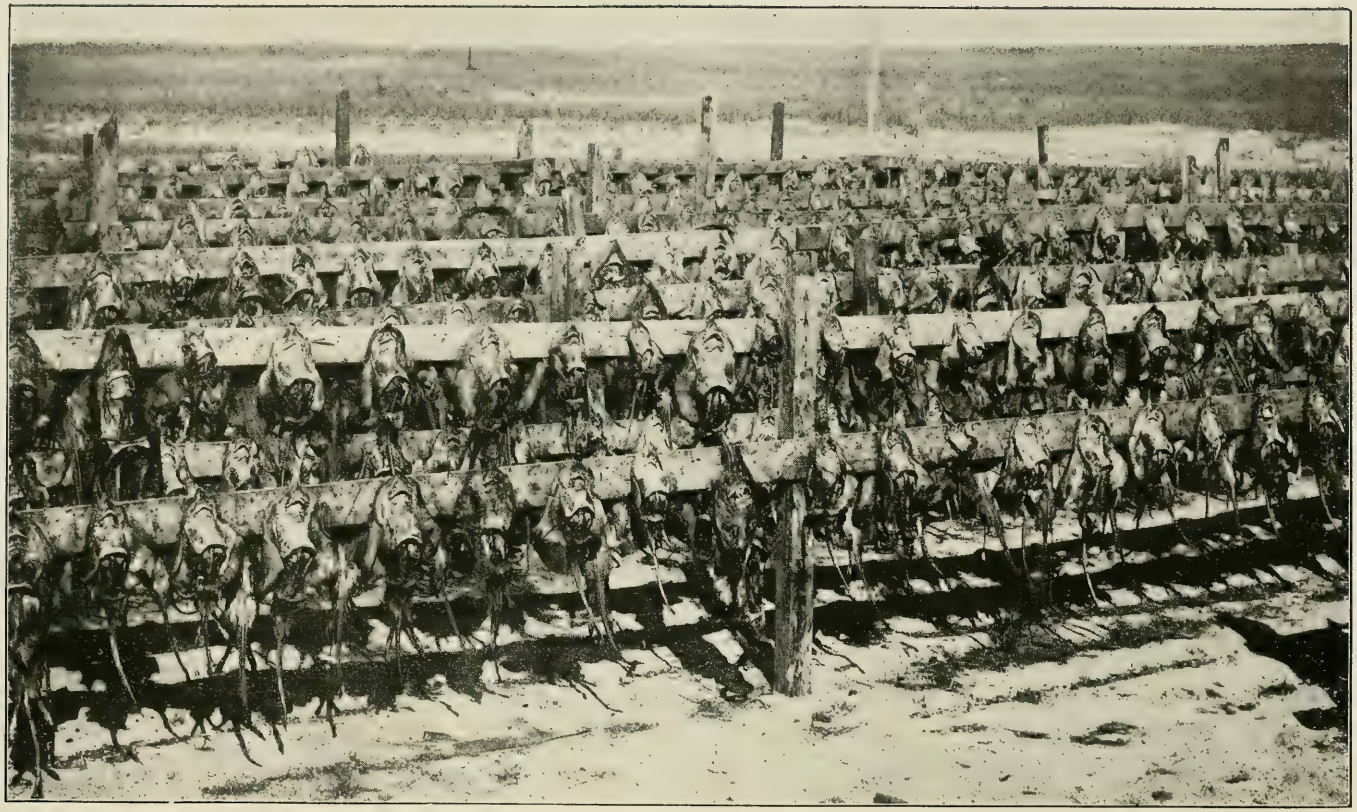
Very early in the history of the Fish Commission it became the custom of Senators and Representatives to ask the Commissioner to have plants of fish made in their state or district. The request was usually for a certain species of fish to be planted in a certain named stream or lake. The requests were always granted if possible, notwithstanding the fact that little or no information was at hand or could be supplied as to the fitness of the stream or lake for the particular species which it was proposed to introduce. Later it became evident that thousands of fish had been planted in waters to which they were not at all suited and in which they would never have been planted if the character of the water had been known.

In order that the fish-cultural work of the Commission might be more effective, the Division of Scientific Inquiry, then under the able direction of Mr Richard Rathbun, now Assistant Secretary of the Smithsonian Institution, undertook to supply as rapidly as possible accurate knowledge concerning the various lakes and river basins of the United States.

During the last twelve years parties from the Division of Scientific Inquiry have been in the field, usually only for a brief period each summer, but often for longer periods. These parties have

School of Black-fish Stranded on the Shore of Cape Cod, Massachusetts

The "black-fish" (*Globiocephalus melas*) occurs in many parts of the Atlantic Ocean. Individuals vary in length from 8 to 22 feet. They are captured by the sperm-whalers, and also at irregular intervals they are secured when stranded on the shore, especially in Cape Cod Bay, where they are attracted by squid, on which they feed. The animals are surrounded by boats and driven like cattle to the beaches, and are there stranded in endeavoring to escape. They are lanced to death, and when the tide falls the blubber and the oil-producing head matter are stripped off and conveyed to try-works on the shore, where the oil is extracted. The greatest catch of black-fish on Cape Cod was made in 1884. On November 17 of that year 1,500 were killed at Blackfish Creek, South Wellfleet, where they had been driven ashore. About a month later 500 more were slain in a great round-up in the bay. Since that time very few have been secured in the bay, nor have they been seen at sea in any such numbers as previous to the slaughter above noted.



Drying Skates for Manufacture into Fertilizer, Opposite Provincetown, Massachusetts

The principal aquatic products used for fertilizer are seaweeds, shells of mollusks and crustaceans, non-edible species of fish, especially the menhaden, and waste parts of edible species. At present the quantity of this fertilizer produced annually in the United States alone approximates 420,000 tons, worth $2,120,000. This is capable of very great increase, especially in the quantity of seaweeds and waste fish employed.

gathered data for each stream examined upon the following points: Character of the country through which it flows, volume of water which it carries, general character of the water as to clearness, purity, and temperature; the species of fishes, mollusks, reptiles, batrachians, and other animals inhabiting the stream or found about it, and the abundance, distribution, and habits of each; also the species of aquatic plants, their distribution, abundance, and their relation to the fishes of the same waters.

The primary and immediate objects of these investigations are to determine what species of fishes each stream already contains, what are the conditions favorable to their well-being, and whether the conditions, physical and biological, are favorable for the introduction of other species. Investigations of this kind have been carried on in about twenty different states—Maine, Vermont, New York, West Virginia, Indiana, Texas, Iowa, Minnesota, South Dakota, North Dakota, Wyoming, Montana, Idaho, Washington, Oregon, California, Florida, Tennessee, and Nebraska. As many of these investigations were made in response to resolutions of Congress calling upon the Bureau to determine the desirability of establishing fish-cultural stations in certain states, it can be seen that a wide area had to be covered, and that the investigations were necessarily hurried and incomplete. Occasionally, however, it has been possible to confine the observations for a longer period of time to a limited area, and more thorough work has resulted.

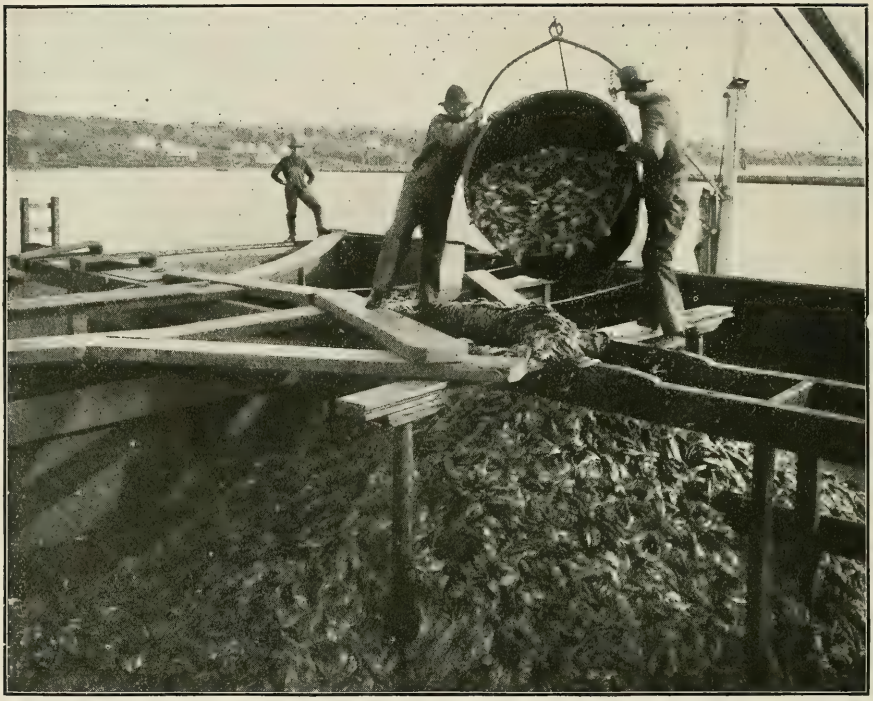
Not until 1899, however, was any such work undertaken under really favorable conditions. The Commissioner desired to secure knowledge regarding the ecology of the great multitude of small glacial lakes of the northern states. It was therefore decided to select a suitable lake and make such a study of it as would serve as a model for the investigation of all similar lakes. Lake Maxinkuckee, in northern Indiana, was known to meet all the requirements exceptionally well and it was selected.

There is not space to give in detail the outline of the investigations carried on at this lake. It must suffice to say that the lake was studied along many lines. A thorough physical survey was made and a very accurate map prepared. Thousands of soundings were taken and the hydrography of the lake carefully studied. Temperature observations were made and the chemical and physical characteristics of the water determined. The species of fishes, other animals, and plants in the lake were catalogued and careful studies of their habits, relations, and interrelations were carried on for one entire year, especial attention being paid to the food, enemies, and breeding habits of the food-fishes. More is now known of this lake, perhaps, than of any other lake in America, and more has been learned of the habits of the species inhabiting it than we know for any other region.

3. *Experiments in Oyster Culture.*—Another investigation which this Bureau is now conducting and which promises very great economic results pertains to the artificial feeding of oysters.

It has been observed that oysters grow much more slowly on some beds than on others; that in certain places they fail to fatten. These places were usually on overcrowded beds, and sometimes good results could be secured by transplanting or thinning out. Qualitative and quantitative study of the diatoms (which constitute the food of oysters) on beds where the oysters fatten well, and on other beds where they fatten poorly, showed that the number of diatoms per liter of water was very much greater in the former than in the latter.

It was therefore believed that if the supply of diatoms could be increased on the unproductive beds the oysters on them would grow and fatten. Experi-



Discharging Menhaden from Vessel by Means of Tubs

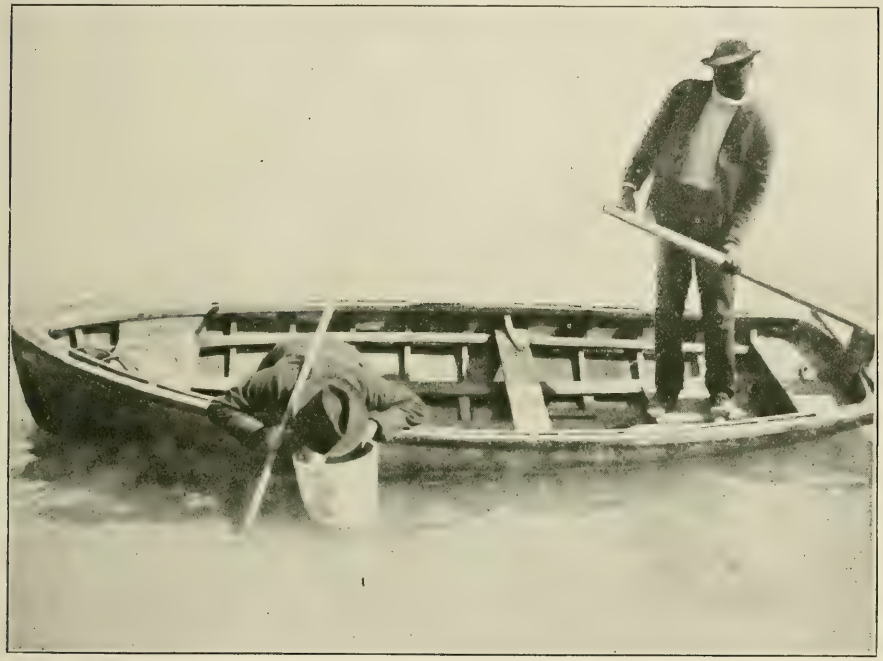
The taking of menhaden on the Atlantic coast of the United States for conversion into oil and fertilizer gives employment to thousands of men and to several million dollars of capital. The menhaden belongs to the *Clupeidæ* or herring family, and is about the size of the common herring of the New England coast, but somewhat deeper and more robust. It is not considered a food-fish and is rarely eaten, owing to the abundance of bones, although the flavor is not unpleasant. However, it is one of the most important of all of the species on the coast, being the principal source of bait during the summer, in addition to its use in the manufacture of oil and fertilizer. The menhaden occurs all along the Atlantic coast of the United States from Maine to Texas, and most abundantly between Cape Cod and Cape Henry, except that during certain years it seeks the coast of Maine in enormous quantities. It appears on the approach of warm weather, ranging from March and April in Chesapeake Bay to May and June on the Maine coast, and remains until late in autumn. Its bathymetrical range extends from the inland limits of salt water to the Gulf Stream, but probably 95 per cent of the catch is made within two miles of the coastal line. It is captured principally by means of purse seines, operated from steam vessels with carrying capacity for several hundred thousand fish. The annual catch averages 500,000,000 fish, amounting to 30 per cent of the total catch of fish in the United States. In 1902 it reached 900,000,000.

ments along these lines were recently inaugurated at Lynnhaven, Va., under the immediate direction of Dr H. F. Moore, of the Bureau. A small cove was selected where the bottom and the salinity of the water were favorable, but where diatoms were scarce. Commercial fertilizers of certain kinds were used to furnish food for the diatoms, and it was very soon found that the latter greatly increased in abundance, and lean oysters transferred to this cove fattened rapidly. Details of the process need not be given here, but it is believed that

the experiments will demonstrate the entire practicability of the artificial feeding and fattening of oysters on a commercial basis.

4. *Experiments in Sponge Culture.*—Still another interesting investigation now being carried on in Florida has for its object the discovery and development of methods by which the valuable sheepswool sponge may be cultivated artificially.

The method which promises the most satisfactory results is that of using cuttings. Large sheepswool sponges are cut into small pieces, which are fastened to an insulated wire fixed in the water, so that the sponges are supported a few inches above the bottom. These small bits, placed at close intervals along the wire, soon heal and form an organic attachment to it, and very soon begin to grow. It is too soon to predict just what the results will be, but the indications are so far very encouraging, and it is believed that the time is not far distant when the sponge fisheries of Florida will be vastly increased in productiveness and value.



Spongers at Work

The only apparatus used is the sponge hook, a three-toothed curved hook attached to poles of varying lengths, according to the depth of water in which the sponger is working, and the sponge glass—a common water bucket with the bottom knocked out and a pane of window glass substituted. The latter is used for seeing below the surface when the water is disturbed by ripples.

Another class of studies carried on by the division pertains to the parasitic enemies and diseases of fishes. These studies are in charge of Mr M. C. Marsh, pathologist of the Bureau. Knowledge of what are the principal diseases which attack our food-fishes, what the causes are, and how the attacks may be pre-

The Sponge Fleet and the Sponge Auction Wharf at Key West

There are two so-called sponge grounds: (1) the "key grounds," the waters of the "keys" extending in the shape of a crescent from Miami to Dry Tortugas, and (2) the "bay grounds," which are the most prolific, extending in the Gulf of Mexico from Johns Pass, a few miles north of the entrance to Tampa Bay, to St Mark's lighthouse, a distance of about 200 miles.

vented or cured will greatly increase the efficiency of fish-culture.

5. *Biological Stations.*—For the study of scientific and economic problems connected with aquatic life, the Bureau maintains, besides the laboratories at the central station here in Washington, two seaside biological stations—one at Woods Hole, Mass., the other at Beaufort, N. C. These stations are well equipped with aquariums, microscopes, reagents, and special apparatus, and investigators are invited to come and make use of the superior facilities offered for the study of marine life.

6. *Pacific Salmon.*—Among the most important investigations now being conducted by the Bureau are those pertaining to the life histories and propagation of the Pacific salmon. On our Pacific coast and in Alaska are found five species of salmon. These salmon spend most of their life in the sea, coming into freshwater streams and lakes only at spawning time. After spawning once they all die, both the males and females, none ever spawning a second time and none ever returning to the sea. This is true of each of the five species of Pacific salmon.

The Bureau has been propagating the Chinook and Blueback salmon for several years, and the efficiency of the work has recently been greatly increased as a result of investigations made by Mr Cloudsley Rutter, whose untimely death a few weeks ago is a severe loss to the Bureau and to science.

7. *Volunteer Assistants.*—As a result of the investigations carried on by this division, the Bureau is now in possession of a vast amount of information regarding many of our rivers and lakes, but in only a few cases can this knowledge be regarded as sufficiently full. The survey is now well systematized, and it is hoped it may be carried on after a definite plan which contemplates a thorough study of all the important streams and lakes in the United States.

Although but few of our waters have as yet been studied even with approximate thoroughness, nevertheless the inhabitants of the streams and lakes of the United States, particularly the fishes, are better known than those in any other country.

In the conduct of its scientific investigations the Bureau has been fortunate in having the volunteer assistance of many of the most active and most distinguished zoölogists in America, among whom may be mentioned Jordan, Agassiz, Gill, Forbes, Gilbert, Jenkins, Bumpus, Linton, Meek, and many others. These men have been glad to give their services, without any salary, to the Bureau for special investigations, their only desire being the advancement of knowledge in those branches of zoölogical science in which they are interested.

3. DIVISION OF FISH CULTURE

This important division has charge of all the fish-cultural operations of the Bureau. The assistant in charge has general direction of all hatching, rearing, and distributing stations and operations, and of all the railway cars, launches, and other vessels of the Bureau while engaged in hatching and distributing fishes and their eggs.

The first fish-cultural stations were mere makeshift affairs, with temporary buildings and moderate equipment, permitting change from place to place as occasion required. Later, as the advantages and disadvantages of different places came to be understood, permanent stations were established and the equipment improved. Later still, Congress began making appropriations for hatcheries to be located in certain specified states. The number has increased rapidly, until now the fish-cultural operations of the Bureau are carried on at 46 different stations, which are well distributed over the United States. There are stations in New England for the hatching

of Atlantic salmon, Sebago salmon, trout, codfish, flounders, and lobsters; on the Great Lakes for whitefish, lake trout, and wall-eyed pike; on the rivers of the Middle and South Atlantic States for shad; in the central and upper Mississippi Valley for trout and black bass; in the Gulf States for black bass and other pond species; at Bozeman, Montana, for grayling and various Salmonidæ, and on the Pacific coast for the Chinook and sockeye salmon and the steelhead trout.

The total number of species of fishes and other aquatic animals that are or have been propagated by the Bureau exceeds 100. With few exceptions, these are all exclusively American species, and the methods for their artificial propagation have been developed wholly in this country.

The output of the hatcheries has increased enormously, especially during the last six years. We no longer speak of hatching thousands of fry, but of millions and hundreds of millions. The number of eggs, fry, fingerlings, and adult fish distributed by the Bureau in 1902 aggregated one and one-half billions.

In distributing this enormous output the Bureau employs five cars, each built especially for this business and owned by the Bureau. Each of these cars is in charge of a car captain, who has the necessary assistants. Each car is equipped with tanks, in which the fish are carried, facilities for aërating the water and for keeping the water pure and cool. There is a small engine in each, adequate cooking facilities, sleeping berths like the upper berths in the standard Pullman, and an office for the captain. These cars are kept almost constantly employed, and travel all over the United States.

EXCELLENT RESULTS OF ARTIFICIAL PROPAGATION

The good results of the artificial propagation of food and game fishes by the federal government are no longer questioned by any one who is at all informed regarding such matters. Equally good results have not been obtained with all the species handled. That would be entirely too much to expect. With some species, as the sturgeon, the results so far are very unsatisfactory. With the Atlantic salmon we do not know whether the supply has been increased by artificial propagation or not, but with practically all the other species now propagated it is certain that excellent results have been secured. It is certain that the shad, whitefish, lake trout, and pike perch fisheries, each of vast importance, have not only been saved from entire depletion, but that they have been maintained, chiefly through artificial propagation, at a high degree of productiveness. That these fisheries are industries today, valued at nearly $3,000,000 annually, is due entirely to artificial propagation by the Bureau of Fisheries.

Important food- and game-fishes are now found in abundance in waters of the United States where they did not exist until planted there by the Bureau of Fisheries. Many examples might be cited, but a few will suffice.

Yellowstone Park.—Originally, the majority of the lakes and streams of Yellowstone Park were entirely without fish of any kind. In 1889 the government began making plants of various species of trout in the different barren waters; now trout are abundant in all these waters, and there are practically no restrictions on angling.

Lake Superior.—The steelhead trout, native only to our Pacific coast, has been introduced into streams tributary to Lake Superior. It has done well, and now thousands of dollars are spent in that region every year by anglers who go there to fish for steelhead trout.

The range of the black bass, yellow perch, crappie, brook trout, rainbow trout, Sebago salmon, cutthroat trout,

and many other species has been greatly extended, and commercial fishing, as well as very attractive angling for these species, is now found in many regions where none was previously known. Eighty per cent of the catch of commercial fishes in Colorado consists of introduced species.

The Carp.—This fish was introduced into this country in the early years of the Commission. It found a congenial home in our more sluggish waters, is now an abundant fish in many parts of the country, and is the object of an important fishery. The catch last year amounted to 17,160,873 pounds, valued at $407,633, an amount nearly equal to the total appropriation for carrying on the work of the Bureau of Fisheries for the current year. A fishery which adds annually that amount of food-stuff to the supply and puts half a million dollars into the pockets of the fishermen is not to be ignored.

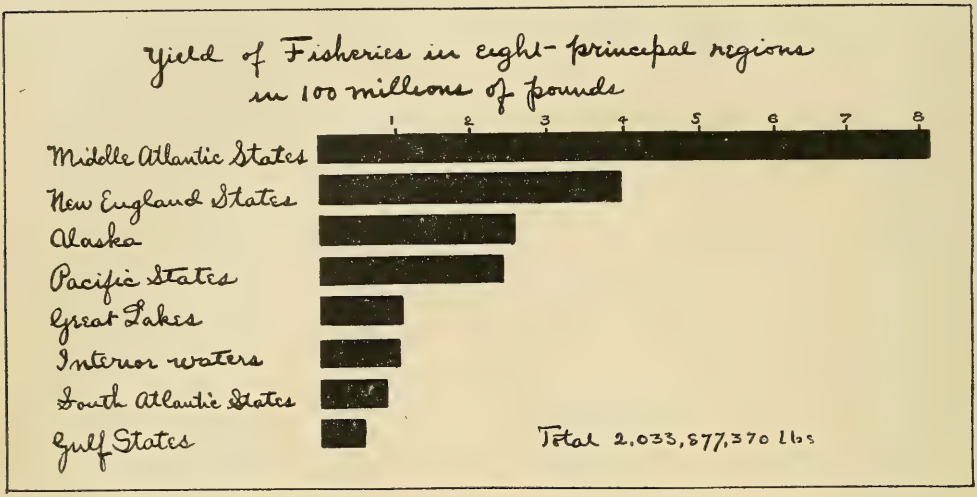
The fact that the introduction of the carp into this country has been severely criticised by anglers and others is of little moment. Not one of the criticisms of the carp has been proved and the majority of them have been shown to be without any basis in fact. The most persistently reiterated charge is that the carp eats the eggs and fry of the bass and other better fish. A sufficient reply to this is the fact that in the Illinois River, where the carp is more abundant than in any other American river, the black bass is now actually more abundant than it was ever known to be before the introduction of the carp. Instead of the carp feeding upon the bass, they furnish food to the bass. The carp brings more money to the fishermen of Illinois than all other fishes of the state combined.

Shad and Striped Bass.—A few years ago these two food-fishes were introduced into Pacific coast waters where neither was previously found. Both species thrived well, and now the catch on the coasts of California, Oregon, and Washington amounts annually to more than 2,500,000 pounds, valued at nearly $78,000. This is an absolute demonstration of the value of artificial propagation, for it is certain that every shad and every striped bass on the Pacific coast are descendants of fish planted there.

That proportionately greater results have followed the propagation of these species on the Atlantic coast is not questioned by any one familiar with the shad and striped bass fisheries.

Pacific Salmon Fisheries.—The salmon fisheries of the Columbia and Sacramento rivers have not only been saved by artificial propagation from absolute ruin, but have been built up to proportions never known before the days of artificial hatching. This fact is admitted by every cannery man and intelligent fisherman on those rivers. Those familiar with the Sacramento say that the run in 1903 was three times as great as ever before known; and the oldest and most intelligent men on the Columbia say that the run in that great river during the season just past was the greatest they ever saw. Government hatcheries on these two rivers for several years have been turning out many millions of fry in their waters.

The condition of the salmon fisheries of Puget Sound, Fraser River, and Alaska is in marked contrast. Little attention has been given to artificial propagation of salmon on Puget Sound, the Fraser River, or in Alaska, regions in which the salmon fisheries have been prosecuted no more assiduously than on the Columbia and Sacramento. The catch in Alaska has been kept up only through more persistent fishing and by utilizing the inferior species not previously considered fit to can. The season of 1903 on Fraser River and Puget Sound was the poorest in the history of the salmon fishery of that region. That the run of salmon has greatly increased



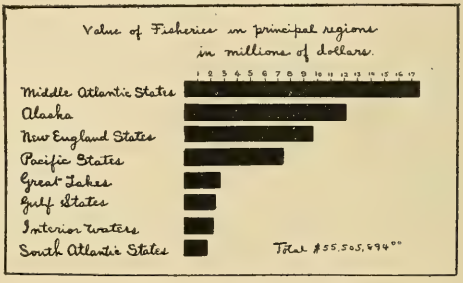
wherever attention has been given to artificial propagation and that it has greatly decreased in all other places are very significant facts, which establish beyond question the value of artificial propagation.

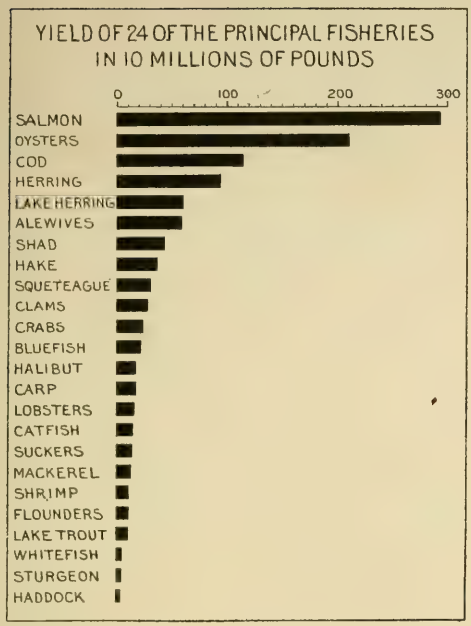
4. DIVISION OF STATISTICS AND METHODS OF THE FISHERIES

The Division of Statistics and Methods of the Fisheries is usually known as the Division of Fisheries. This division has to do with the commercial fisheries, both of the seas and the inland waters in their statistical and economic relations, the apparatus and methods of the fisheries, the methods of utilizing fishery products, the methods and conditions of the wholesale and retail trade in these products, the effects of fishery legislation and international fishery regulations, and ways and means by which the demand for aquatic products may be increased and the domestic and foreign market extended. In brief, this division has as its function the consideration of all the resources of the rivers and lakes and of the seas in all their economic relations.

The division acts as a bureau of information in the interests of the fishermen by acquainting the fishermen of one region with the improved apparatus and improved methods in use in other regions. In this manner the adoption of modern gear and methods is encouraged and the use of antiquated, destructive, or unlawful apparatus and methods is discouraged.

As has been well stated by Mr Charles H. Stevenson, of this division, the finding of the Halifax Convention of 1877, whereby our government was made to pay $5,500.000 to Canada on account of certain fishing privileges granted by the Treaty of Washington, "emphasized the necessity of having at hand accurate and comprehensive statistics of the fisheries and the impossibility of judicious legislation without them." It is claimed by those in position best to know the





facts that such an award would never have been made if our government had been in possession of complete and accurate statistics of the fisheries involved, such as the Bureau now possesses.

THE ENORMOUS VALUE OF THE UNITED STATES FISHERIES

The vast amount of nutritious, wholesome, and delicious food-stuff resulting from the fisheries of the United States is not generally realized. Some conception of it may be had from an examination of the diagrams here shown.

The total catch of food-fishes in the United States and Alaska, as shown by the last canvass, was 1,733,314,324 pounds, valued at $45,531,165. The number of men employed was 214,056 and the capital invested was $72,261,646. The salmon pack of Puget Sound alone in 1901 exceeded four and one-half millions of dollars, an amount more than four times as great as the entire silver output of the whole region drained by the Columbia River. The salmon output of Alaska for 1903 is valued at $10,000,000, which exceeds by more than two and one-half million dollars the amount which Alaska cost us; and if we add to the salmon the value of the cod, halibut, and other fisheries of Alaska, the total greatly exceeds all the other resources of Alaska combined.

In the early history of our country, when population was sparse, unaided nature could be depended upon to furnish much of the food which man needed, whether fruit, fish, flesh, or fowl. Deer and many other game animals were found in abundance both in the forests and on the plains. Game birds, including the wild turkey, grouse, quail, passenger pigeon, and many species of water fowl, existed in even greater abundance. Edible wild fruits and berries were found in great profusion, while the waters of the coasts, streams, and inland lakes teemed with delicious food-fishes of many kinds. The pioneers were literally able to live upon the natural products of the country. But population has vastly increased and, *pari passu*, the natural products of the country have decreased. Many of them have become extinct or practically so. We can no longer live upon the wild products of the country. In place of native game birds we must now depend upon the cultivated turkey and other domesticated fowl. In place of the vanishing game animals of forest and plain we now have vast numbers of cattle, sheep, and other domesticated animals. To supply the world's demand for food, fruits and grains, fowls and mammals must be cultivated; unaided nature can furnish but a mere trifle of the amount required. The resources of the sea and of the inland waters have not been so easily exhausted as those of the land. Aquatic animals were probably not only more abundant, but they were more difficult to get at, and it was more difficult for man to interfere with the conditions under which they live; but, though

longer delayed, depletion was inevitable. Population is increasing rapidly, and the demand for sea-food is increasing even at a greater ratio.

As a result of improved methods of canning, salting, smoking, freezing, or otherwise preserving, not only are the well-known food-fishes put upon the market in many new and attractive forms, thus greatly increasing the demand for them, but methods for the utilization of species hitherto regarded as useless are being discovered every year.

WILL OUR FISHING GROUNDS BECOME EXHAUSTED?

The marvelous increase in the facilities for distribution has widened the field and enormously increased the demand for the food products of the sea. Fresh oysters, clams, lobsters, shad, rockfish, and mackerel from the Atlantic coast; oysters, crabs, shrimps, and red snappers from the Gulf coast; and lake trout, pike perch, and whitefish from the Great Lakes, now find their way daily in their season into every state and territory of the Union; while the Pacific coast and Alaska send fresh halibut, steelhead trout, and royal Chinook salmon all over the United States and to Europe, the fish reaching their destination as fresh and sweet as when taken from the Columbia or the icy waters of Alaska.

To expect unaided Nature to keep pace with this ever-increasing demand for aquatic products is as unreasonable as it would be to expect the uncultivated land to meet the demand for grains and fruits and the butcher's food.

Cultivation of the coastal and interior waters is as possible and imperative as is cultivation of the land, and promises quite as rich returns. An acre of water can be made even more productive than an acre of land. On land, the producing area is a surface, but the total producing area of a body of water is many times the superficial area of its bottom. Dr Brooks of Johns Hopkins University, whom no one would ever charge with being a dreamer, says that the time will surely come when the oyster harvest of Chesapeake Bay each year will be fully equal to the total harvest of the last 50 years.

Oyster culture and fish culture are still in their infancy, and I am convinced that the time is not far distant when, through fish-cultural operations, the annual catch of each of many of our important food-fishes, particularly the shad on the Atlantic coast and the salmon on the Pacific coast and in Alaska, will be many times greater than it has been in the past.

Vice-Admiral Makaroff, whose tragic death on April 13 is much deplored, during recent years was one of the most prominent figures in the geographic world. His plan for reaching or getting near to the North Pole by means of his ice-breaker *Yermak* was original, and while the one test given was unsuccessful, the plan was not disproved. A summer's experience with the polar pack in 1901 showed that the vessel could crush a way successfully through one-year-old ice, but that it was helpless against older and thicker floes. The test showed that vessels of the *Yermak* type would be extremely useful in helping to explore the Arctic coast of Asia. It has also made many believe that while the type is not adapted for polar work north of Europe and Asia, it might prove more successful by the American, or Smith Sound route, where conditions are generally quite different.

THE GEOGRAPHY OF ALASKA*

ILLUSTRATED BY A NEW MAP

By Alfred H. Brooks

AMONG the many maps of Alaska which have appeared during the last half century, none has attempted to depict any but the horizontal relation. The accompanying illustration, therefore, marks a distinct advance in that it also expresses the vertical element or relief, by the use of 1,000-foot contours. The scale of 2,500,000 (about 40 miles to the inch) has been adopted to facilitate comparison with a map of the United States on the same scale, also published by the Geological Survey. The compilation begun three years ago was done under the direction of the late Mr R. U. Goode, chiefly by Mr E. C. Barnard.

This map, representing as it does a graphic synopsis of all that is known of the geography of Alaska, has great value, even though future surveys must show error in many of its details; for the general facts of the relief and drainage are known to be correctly indicated, and as surveys of this northern region progress, it will be possible to make adjustments and changes in new editions.

In the main, the map is based on the work of the Geological Survey parties during the years 1898–1903, but the shore features were furnished by the charts of the U. S. Coast and Geodetic Survey. That no material might be overlooked, all other Alaskan maps were consulted, including those of the Army, the Navy and Revenue Marine Service, and the Russian, British, and Canadian governments; and when exact cartographic data was lacking, the compiler had recourse to such information as had been collected by the Geological Survey parties from prospectors, traders, and natives. In every case the most reliable source of information has been used, yet the fact that the map is in part based upon accurate surveys and in part generalized from verbal descriptions and sketch maps gives to its different sections a very unequal value and suggests that it will be subject to many corrections in the future. However, the demand for a general map of Alaska which shall show the relief has been so great as to seem to justify the publication of one based only in part on accurate mensuration. A study of the diagram in the upper right-hand corner of the map will show, approximately, those parts in which the cartographic data was most reliable, the shaded spaces indicating the area in the interior of which surveys have been made. In all, about 150,000 square miles of the total area of 590,000 square miles have been surveyed, and at least two-thirds of the balance has been roughly mapped.

SURVEYS AND EXPLORATIONS

It would be impossible here even to outline the development of the geographic investigation of Alaska, which has been prosecuted intermittently since the early part of the eighteenth century, but with especial activity during the past decade. There are a few, however, of the more important surveys and explorations which should be mentioned.

In 1711 a Russian Cossack named Popof, who had been sent to the East Cape of Siberia to collect tribute from the natives, brought back an account of the islands which divide the Bering Straits, with rumors of a continent re-

* Published by permission of the Director, U. S. Geological Survey.

ported to lie beyond. This was the first intimation received by white men of what is now known as Alaska. The subsequent explorations seem to have taken place from three directions: the Russians reached it from the west, across Siberia and Bering Sea and Straits; the English came from the east, by way of the Mackenzie Valley; and navigators of various nationalities explored its coast, approaching it from the south by following the eastern shore of the Pacific. Among the most prominent of these early expeditions, which charted much of the coast line, were the Russians, led by Bering, Lütke, and Kotzebue; the English, led by Cook, Vancouver, Franklin, and Beechey; a few Spaniards; one Italian, Malaspina; and La Perouse, a Frenchman. These, together with many of lesser note, in the interval between Bering's first voyage (1728) and the middle of the eighteenth century, had obtained a general outline of the coast, but it remained for the Coast and Geodetic Survey to undertake its detailed charting after the transfer of the territory to the United States.

Previous to 1865, but little was known of the interior of Alaska, which was then called Russian America. The Russian traders had pushed their way 1,000 miles up the Yukon, had explored the lower stretches of the Kuskokwim and the Stikine, and had made an abortive attempt to explore the Copper River, which ended in the murder of the entire party by the natives. Following the routes marked out by such explorers as Franklin and Mackenzie, the Hudson Bay traders had reached the Mackenzie River, and in the middle of the nineteenth century crossed to the Yukon waters, where their two posts controlled the fur trade of the upper river. From the other direction the Russian traders had traversed northern Asia and arrived in North America by way of Bering Strait and the Aleutian Islands. Thus it was here in Alaska that the rival fur-trading interests came into competition, after encircling the globe.

In 1865 the Western Union Telegraph Company organized a survey of northwestern America, with a view to finding a route from the United States through Canadian territory and Russian America to Bering Strait, to connect by cable with a line crossing Siberia from Europe. The success of the Atlantic cable led to the abandonment of the project, but the results gained by the scientists and explorers of the expedition, of whom Dr Wm. H. Dall was the most prominent, have been of lasting importance. Those of geographic value are a map of the Yukon River and important additions to the knowledge of the Yukon delta, Seward Peninsula, and the Norton Bay region. It is interesting to note that the route which these first explorers selected was practically the same as that adopted by the telegraph lines which are now being constructed in Alaska and adjacent Canadian territory.

When Alaska first passed into the possession of the United States, in 1867, but little attempt was made to explore the interior. In 1869 Capt. R. W. Raymond, U. S. A., was sent up the Yukon to determine the approximate position of the international boundary and thus settle the conflicting interests of American and British traders. In 1883 Lieut. Frederick A. Schwatka, U. S. A., crossed the Chilkoot Pass and descended the Lewes and Yukon rivers to Bering Sea, making reconnaissance surveys en route. During the succeeding decade explorations in the interior were fostered by various branches of the government and by private enterprise, but only intermittently and not as the result of any definite plan. Perhaps the most notable expedition in the annals of Alaskan exploration is the one conducted in 1885 by Lieut. Henry T. Allen, now general and chief of the constabulary forces in the

Philippines. In spite of great difficulties and hardships, he ascended Copper River, crossed to the Tanana, and, following that stream to its mouth, extended his explorations for some 300 miles up the Koyukuk. During the years 1884 and 1885 Lieut. George M. Stoney, U. S. N., made extensive explorations in the drainage basins of the rivers tributary to Kotzebue Sound. Lieut. W. L. Howard, a member of this party, during the winter of 1886 crossed the region lying between the headwaters of the Kobuk and the Arctic Ocean. Meanwhile, in 1884, Lieut. John C. Cantwell and other officers of the Revenue Marine Service also made explorations in the Kotzebue Sound region.

The pioneer traders and prospectors have done much toward the exploration of Alaska, though the results of their many hazardous journeys have not always been available to the public. The first of these frontiersmen, who were traders rather than prospectors, came into the Yukon Basin via the Hudson Bay Company's routes from the valley of Mackenzie, probably early in the seventies. During the succeeding two decades they established trading posts at various points on the Yukon. A small steamer made one trip up the Yukon each summer, for the purpose of supplying these traders, to take the furs to St Michaels, whence they were shipped to San Francisco. There are few records of the explorations of these pioneers, but we know that Frank Densmore explored the Kuskokwim, Arthur Harper the Lower White and Lower Tanana, Jack McQuesten the Koyukuk, and Jack Dalton the White and Alsek basins. The knowledge these men obtained through their own efforts and by their intercourse with natives was in course of time embodied in the maps of the Alaskan region; and when the prospectors entered the region, about 1885, this information was of great use to them.

In 1889 the international boundary was located on the Porcupine and Yukon rivers by J. E. Turner and J. E. McGrath, of the Coast Survey, and was the first geodetic work done in the interior. Turner, in connection with this survey, led an expedition from his winter camp on the Porcupine along the 141st meridian to the Arctic Ocean.

Lieutenant Schwatka and Dr C. Willard Hayes, in 1891, made a journey from Fort Selkirk to the head of the White, and crossing to the Copper, followed the stream to its mouth. The same year E. J. Glave, one of Stanley's men, who lost his life in the Congo Basin, and Jack Dalton made their way westward from Pyramid Harbor to Kluane Lake. This expedition was important in that it was the first on which pack animals were used in Alaska.

The discovery of gold on the Yukon in 1886 resulted in the region gradually becoming better known, largely through the efforts of prospectors. At first the approach to the new gold diggings was made by the mouth of the river, but later a route across the Chilkoot Pass, which had been jealously guarded by the coast Indians, was opened up, and during the succeeding decade was annually used by not a few prospectors. The discovery of the phenomenally rich placer diggings in the Klondike in 1897 was followed by a great influx of gold-seekers during the succeeding two years. In the years 1897 and 1898 probably 60,000 people made their way to Alaska and the Yukon territory by various routes, but most of this travel was by the well-known coast passes from the head of Lynn Canal.

The public interest thus aroused led to a demand for more exact information, which resulted in appropriations being made for several government bureaus to undertake this work, and exploration and surveys were begun in 1898. The Geological Survey had six parties in the field the first year, and

has continued these surveys ever since. It is not possible to make mention here of all the surveys which have been carried on in Alaska by some thirty different parties. It will suffice to say that in six field seasons all but three of the larger rivers of Alaska have been mapped, as well as many large interstream areas. The results have been mostly published on a scale of 1:250,000, but it is planned to follow this reconnaissance mapping by detailed surveys, which have already been begun.

Among the notable explorations made by the Geological Survey was one by J. E. Spurr, who ascended the Yentna, the left fork of the Sushitna, and, portaging to Kuskokwim waters, descended the latter river to its mouth, and then returned to Cook Inlet by crossing the Alaskan Peninsula, completing a journey of some 1,400 miles. Another was by a party led by W. J. Peters, which left the coast at Lynn Canal, and, going westward along the northern base of the St Elias range, reached the headwaters of the White River, then extended its explorations to the head of the Tanana and crossed to the Yukon at Fortymile. In 1901 W. J. Peters and F. C. Schrader made a trip which included a journey the entire length of Alaska, from the southernmost limit to Point Barrow. During the winter they traveled to the Koyukuk with dog teams, thence ascended one of the north forks of that stream, crossed to a tributary of the Colville, and made their way to the Arctic Ocean. They then skirted the coast westward to Point Barrow and finally southward to Cape Lisburne, where they were so fortunate as to find a steamer. In the same year W. C. Mendenhall and D. L. Reaburn explored the headwaters of the Allen and Kobuk Rivers, and followed the latter to its mouth, at Kotzebue Sound.

In 1902 Brooks and Reaburn made a survey of the western front of the Alaskan range during a journey of 800 miles from Cook Inlet to the Yukon. Areal surveys have also been completed of the entire Seward Peninsula and of the Copper River basin.

The foregoing sketch will show the progress of Alaskan surveys from 1709 to the present day, and the accompanying map embodies the results of this mensuration.

GEOGRAPHIC FEATURES

It will be of interest to study Alaska with the aid of this new map, and to compare it, both as to position and to dimensions, with better-known parts of the earth's surface. This relief map also permits of a classification of Alaska's salient physiographic features to a better understanding of its topography.

An examination of a chart of the world will show that the latitude of Alaska corresponds approximately to that of the Scandinavian Peninsula. Point Barrow, the northernmost cape of Alaska, is in about the same latitude as North Cape. Dixon Entrance, which marks the southernmost point, is nearly on the same parallel as Copenhagen. Sitka, the capital of Alaska, is in the latitude of Edinburgh, in Scotland.

To consider the longitude, the meridian passing through the westernmost of the Aleutian Islands passes near the New Hebrides and through New Zealand. Cape Prince of Wales, the most westerly point of the mainland, is nearly as far west as the Samoan Islands.

Alaska stretches through 27 degrees of latitude and 54 of longitude. Its east-and-west dimension, measured to the extreme limit of the Aleutian Islands, is almost exactly equal to the distance from Savannah, on the Atlantic coast, to Los Angeles, on the Pacific. Its most northerly and southerly points are as far apart as the northern and southern boundaries of the United States.

Alaska, the northwestern extremity of the North American continent, forms in its main mass a peninsula nearly rect-

angular in outline, cut off from the continent by Mackenzie Bay on the north and the Gulf of Alaska on the south. South of it lies the Pacific Ocean. On the west it is bounded by Bering Sea and Bering Strait and west and north by the Arctic Ocean.

The territory is extended west and southwest by its two peninsulas of considerable size—the Seward Peninsula, which with the Chukchee Peninsula divides Bering Sea from the Arctic Ocean, and the Alaskan Peninsula, which, continued in its archipelagoes, the Aleutian Islands and Commander Islands, cuts off Bering Sea from the Pacific Ocean. The coast of Alaska is of two distinct topographic types. Northward from the Alaskan Peninsula shallow-water conditions usually prevail, the coast line is very regular, and the land slopes gently from the shore. Eastward and southward from the Alaskan Peninsula the shores are usually abrupt, with many embayments and islands. This Pacific Coast region is included in the glaciated area of Alaska, while along the western and northern coasts glaciation is either entirely absent or only of local character.

The Pacific Coast line forms a deep reëntrant angle, which is occupied by the Gulf of Alaska. It is bounded on the east by the Panhandle of the territory, usually called Southeastern Alaska, and on the west by the Alaskan Peninsula. It will be shown that the axes of the dominant mountain chains undergo, too, a marked change in direction, and are parallel to the crescent-like bend of the southern coast line. A study of the geology goes to show that this is the topographic reflection of an important structural feature.

A clear conception of the main features of the topography of Alaska can be obtained by comparing them with those of the western United States. A broad mountainous belt, called by Major Powell the Pacific Mountains, including the coast ranges of California, Oregon, and Washington, the Sierra Nevada, and the Cascade Mountains, extends along the western margin of the United States and is continued by other ranges northward into Canada. East of this lies the Great Basin or Central Plateau region, which also finds its counterpart in British Columbia to the north. The eastern limit of the Plateau region is marked by the Rocky Mountains, which again, like the western Pacific Mountains, extend into Canada. To the east of these the Great Plains extend northward to Arctic waters.

Dr George M. Dawson and others have shown that these four topographic provinces of the United States, which are fairly well defined throughout western Canada, find their continuation in similar geographic features in Alaska. The general trend of the highlands in Alaska, as in the United States and Canada, is parallel to the coast line. Attention has already been called to the great southwest bend of the Alaskan shore line near latitude 60°. The orographic features of the mainland experience a similar change in direction, continuing parallel to the shore line.

Alaska is thus divisible into the same four geographic provinces as those of western Canada and the United States. The lines of demarkation between these provinces are usually sharply drawn. Each is of a predominant topographic type, though each may be subject to many minor topographic subdivisions.

A mountainous belt skirting the Pacific coast of Alaska and British Columbia, extending inland from 50 to 200 miles, forms the westernmost of the four provinces, which, in conformity with Major Powell's classification, I will call the Pacific Mountain System. It properly includes the mountainous Alexander Archipelago and Aleutian Islands, and a number of other island groups which lie adjacent to the coast. The Pacific Mountains belt is made up of

four distinct ranges—the Coast, St Elias, Alaskan, and Aleutian. These are often separated by broad valleys or indentations of the coast line, and while the topography of the system is mainly rugged and mountainous, it includes several large basins, like that of the Copper River.

East and north of the Pacific Mountains is the Central Plateau region, limited on the north and east by the Rocky Mountains, corresponding with the Great Basin region of the western United States. The term plateau can only be assigned to a part of this province, and not even that by strictest usage. Its dominating topography is a gently rolling upland of low relief, compared with the mountain systems, in which the rivers have trenched broad channels. The interstream areas mark a former plateau surface, which the erosive agents have dissected. This plain slopes gently toward the axis of the basin, and the axis is tilted to the north and west. Its surface is interrupted by a number of mountains and mountain groups, which rise above the general level. Within this belt are also a number of lowland areas of considerable extent, which lie below the upland surface. Among these the flat of the middle Yukon is notable. The lowlands which extend along Bering Sea adjacent to the Kuskokwim and Yukon rivers are included in this province.

To the east and north is a broad mountain system, but little explored, which forms the third of the geographic provinces. It is, as has been shown, the northern extension of the Rockies. These, like the Pacific Mountains, also undergo a marked change in direction. Trending northwestward from the United States and Canada, they swing to the southwest at the Arctic shore, which they touch again north of Bering Strait. The system is represented in Alaska by the Endicott Mountains, and probably by several other ranges as yet unsurveyed.

The fourth province is that of the plains lying east of the Rockies, which in Alaska is represented by the Arctic Slope region, lying between the western extension of the Rockies and the Arctic Ocean. This province, like that of the western United States, is really a slightly elevated plateau, dissected and more or less rolling, which slopes to the north from the foothills of the Rocky Mountains. A featureless coastal plain, of varying width, separates the northern boundary of the plateau, which is marked by a scarp, from the Arctic Ocean.

About one-fifth of the drainage of Alaska is toward the Pacific Ocean, nearly one-half toward the Bering Sea, and the rest toward the Arctic Ocean.

The map shows the Yukon to be the master stream, and the outlines of its basin correspond in a general way with the boundaries of the Central Plateau province. The headwaters of this mighty river, the fifth in size of the North American continent, lie in British Columbia far to the southeast of Alaska, where they fight for mastery on one hand, with the water-courses flowing into the Pacific, and on the other with those belonging to the Mackenzie drainage basin, flowing into the Arctic Ocean. The general course of the Upper Yukon and its tributaries is northwest as far as the Arctic Circle. It then makes a great southwest bend and pours its great volume of muddy waters into Bering Sea nearly 3,000 miles from the source of its longest tributaries. The valley of the Yukon occupies the medial line of the plateau province, and with it makes the same great bend to the southwest parallel to the swing of the two mountain systems to the north and south. The relief, which is measured by the altitude of the remnants of the plateau above the floor of the valley, is greatest near the international boundary and decreases both above and below. A narrow valley characterizes the Upper Yukon proper, which broadens out at

the so-called Yukon Flats, near the big bend, and contracts again below in the Ramparts, and then broadens out below the mouth of the Tanana.

The northern and eastern limits of the catchment basin are generally defined by the crest line of the inland frontal ranges of the Rocky Mountain system, but this does not always hold true, for the Peel River, a tributary of the Mackenzie, has its source west of the Rockies. On the other hand, the Macmillan River finds outlet in the Yukon drainage after traversing one of the ranges of the Rocky Mountain system. The southern and eastern divide of the Yukon basin is even of greater irregularity. On one hand, some of its tributaries find their sources to the south of the ranges of the Pacific Mountain system, and on the other a number of large rivers emptying into the Pacific have their headwaters inland of this barrier.

The Yukon River forms the great natural highway of Alaska. In summer 3,000 miles or more of navigable waters are found within its basin, and in winter the frozen surface of the river affords a route of travel for dog teams. It was along the rivers that the pioneer could best journey, for on his crude rafts or boats, built of the timber which grew on the banks, he could transport necessary supplies, and later the steamboat succeeded to that propelled by hand.

The Kuskokwim, flowing into Bering Sea, is second only to the Yukon among Alaskan rivers, and includes probably upward of 1,000 miles of waters which are navigable for steamers. Its basin lies west of the Alaskan range and entirely within the plateau province.

The Pacific drainage embraces two classes of rivers: First, those whose catchment basins lie entirely within the coastal zone of mountains, and, second, those whose courses reach into the interior region and traverse the mountains on their way to the sea. Of the first the Sushitna and Copper, and of the second the Alsek, Taku, and Stikine are the most prominent examples.

The Arctic Ocean receives the waters of a small part of the plateau provinces through short rivers draining the northern part of the Seward Peninsula and some larger ones flowing into Kotzebue Sound. Much of the larger part of the Arctic drainage consists of that received from the interior valleys of the Rocky Mountain ranges and from their northern slopes. Under the former are comprised the drainage basins of the Noatak and the Kobuk, both streams including navigable waters which are bounded both north and south by the mountains of the northern system. The second class of waterways includes the northerly flowing streams which receive the drainage from the seaward slope of the Rockies. The Colville, the largest of these streams, properly belongs to both classes, for its source lies well within the front ranges, which it traverses in a narrow valley, and it also receives a large amount of drainage from the northern slope of the Rocky Mountains.

"Commercial Japan in 1904," a monograph just issued by the Bureau of Statistics, shows that the trade relations between the United States and Japan in recent years have grown with greater rapidity than between Japan and any other nation. Japan sends us mainly what is not grown in this country—raw silk, tea, rice, matting, bamboo, and lacquered ware, etc.—while we in return ship her annually great quantities of raw cotton, oil, iron and steel manufactures, breadstuffs and provisions, tobacco, scientific instruments, etc.

TERMINATION LAND

THE WESTERN END OF THE ANTARCTIC CONTINENT DISCOVERED BY THE AMERICAN WILKES

*In the deserved congratulations that are being showered on Captain Scott, of the British Antarctic Expedition; Captain Drygalski of the German; Captain Bruce of the Scottish, and Captain Nordenskjold of the Swedish, for their gallant achievements in the Far South, the world is apt to forget that the American naval commander Wilkes discovered in 1840, and first announced to the world the antarctic continent, called "East Antarctica," of which Wilkes Land is a part, and that another American, Captain Palmer, was the pioneer explorer of the opposite side of the antarctic region known as "West Antarctica." The story of the bold ventures of these Americans in puny sailing vessels is told by Mr Edwin Swift Balch in his "Antarctica," the clearest and most accurate account of south polar exploration that has been published.**

ON the 17th of February, 1840, Lieut. Charles Wilkes, U. S. N., at the most westerly point of his memorable cruise which first revealed to the world the existence of a south polar continent, saw appearances of land to the southwest. It was only another point of the continental shore along which he had already sailed for some fifteen hundred miles, and all he says of it is the following sentence:† "On the 17th, about 10 a. m., we discovered the barrier extending in a line ahead, and running north and south as far as the eye could reach. Appearances of land were also seen to the southwest, and its trending seemed to be to the northwest. . . . We were now in longitude 97° 37′ E., and latitude 64° 01′ S." Wilkes charted this land as extending from about latitudes 63° 30′ south to 65° south, and from about longitudes 95° west to 97° west, and he gave it the name of Termination Land.

Just recently Dr Erich von Drygalski published a paper and chart ‡ giving the results of the cruise of the *Gauss* to the Antarctic. On his map Dr von Drygalski charts a coast line, "Hohes Eisbedecktes Land," in about 66° south latitude and 93° west longitude, as discovered by himself. Entirely north of 65° south latitude and entirely east of 95° west longitude he places the words "Termination Land?" In his paper, page 23, Dr von Drygalski says: "Als Stütze dieser Annahme galt ein von Wilkes als Anschein von Land bezeichnete und mit dem Namen Termination Land belegte sichtung zwischen 95° und 96° Ö. L. v. Gr. und zwischen 64° und 65° S. B., welche jedoch, wie wir heute annehmen müssen, auf Taüschung beruht hat." And at page 26 he writes: "Nach zwei vergeblichen Versuchen, die uns nur über das Nichtvorhandensein von Termination Land kunde brachten." In other words, Dr von Drygalski coolly proposes to throw out Admiral Wilkes' discoveries entirely in order to take all the credit to himself.

But a comparison of Admiral Wilkes' chart with Dr von Drygalski's chart shows that the latter's "Hohes Eisbedecktes Land" can be nothing but the west coast of Termination Land; for if on Wilkes' chart we draw a line due southwest from the position of the *Vincennes* on the 17th, this line will go through the center of Termination Land; and if on Drygalski's chart we draw a similar line from the position which he

* Antarctica. E. S Balch. Philadelphia: Allen, Lane & Scott. 1902. $2.50 *net.*

† Narrative of the United States Exploring Expedition, Philadelphia, 1845, vol. 2, p. 327.

‡ Zeitschrift der Gesellschaft für Erdkundzu Berlin, 1904, No. 1.

gives of the *Vincennes* on the 17th, this line will go straight to the "Hohes Eisbedecktes Land." The direction tallies exactly. Now, as to distance, the western coast of the "Hohes Eisbedecktes Land," the one which Dr von Drygalski saw, is about 150 miles from the position of Wilkes on the 17th, and as this land must have some eastward extension and an eastern coast, it is obvious that this eastern side can not be very far from where Wilkes placed Termination Land. Besides, this "eisbedecktes" is also "hohes" land; that is, it is a high, mountainous land, and therefore it must be visible at a long distance. Sir James Clarke Ross states that he sighted Victoria Land at over one hundred miles distance by the land blink, and Wilkes was certainly as near as that to the eastern coast of Termination Land.

Thanks to the voyage of the *Gauss*, therefore, the world now knows positively that Termination Land exists, perhaps a few miles more to the west, but otherwise just about where Admiral Wilkes charted it; and, far from discrediting Admiral Wilkes, the observations of Dr von Drygalski simply show once more what a remarkably acute and accurate geographical observer Admiral Wilkes was.

EDWIN SWIFT BALCH.

LESSONS FROM JAPAN

ONE of the assignments of David G. Fairchild, agricultural explorer of the Department of Agriculture, during 1903 was to visit Japan with the third Barbour Lathrop Expedition to see if some agricultural lessons might not be learned from a people who are such ingenious farmers that their 45,000,000 people live almost entirely on the productions of a cultivated area about one-third the area of Illinois. As a result of this visit, two interesting reports by Mr Fairchild have been published by the Department.* A number of new plants of commercial value have also been introduced, which promise a material addition to the wealth of our country and new crops of value for the South—among them, mitsumata, a Japanese paper plant, and new varieties of bamboo.

From the bark of trees and shrubs the Japanese make scores of papers, which are far ahead of ours.

The walls of the Japanese houses are wooden frames covered with thin paper, which keeps out the wind but lets in the light, and when one compares these paper-walled "doll houses" with the gloomy bamboo cabins of the inhabitants of the island of Java or the small-windowed huts of our forefathers, one realizes that, without glass and in a rainy climate, these ingenious people have solved in a remarkable way the problem of lighting their dwellings and, at least in a measure, of keeping out the cold.

Their oiled papers are astonishingly cheap and durable. As a cover for his load of tea when a rainstorm overtakes him, the Japanese farmer spreads over it a tough, pliable cover of oiled paper, which is almost as impervious as tarpaulin and as light as gossamer. He has doubtless carried this cover for years, neatly packed away somewhere about his cart. The "rikisha" coolies in the large cities wear rain mantles of this oiled paper, which cost less than 18 cents and last for a year or more with constant use.

* "Japanese Bamboos and their Introduction into America," and "Three new Plant Introductions from Japan" by David G. Fairchild. Bulls. 43 and 42, Bur. Plant Ind. Dep't of Agric.

An oiled tissue paper, which is as tough as writing paper, can be had at the stationers for wrapping up delicate articles.

In the tea factories, the piles of paper sacks filled with tea are made of shibu gami. It is said that these tanned sacks keep the tea in better condition than any other sort, and that they last with careful use for many years. Grain and meal sacks are almost always made of this same paper in Japan, for it is not easily penetrated by weevils and other insects.

But perhaps the most remarkable of all the papers which find a common use in the Japanese household are the leather papers of which the tobacco pouches and pipe cases are made. They are almost as tough as French kid, so translucent that one can nearly see through them, and as pliable and soft as calfskin. These tobacco pouches quite change one's notions of the characteristics of paper, for the material of which they are made is as thick as cardboard, but as flexible as kid.

The use of paper napkins and handkerchiefs, umbrellas, and lanterns is as much a part of home life in Japan as the use of cheap tin articles is in America. But the reason for this remarkable use of paper articles does not lie wholly in the absence of cheap skins, though it is true that few domesticated leather-producing animals exist in Japan. The quality of the papers themselves makes them suitable, as ours are not, to these various purposes.

These Japanese bast papers are made from the inner bark of shrubs or small trees, while the papers of Europe and America are made either from wood pulp, the macerated stems of wild grasses, or the cotton and linen rags of the ash barrels. It is not a pleasant thought that the brilliant white note paper which your hand rests upon may have in it the fibers from the filthy garment of some Egyptian fellah after it has passed through all the stages of decay until it is saved by a ragpicker from the gutter of an Egyptian town; and yet it is a fact that hundreds of tons of Egyptian rags are exported every year into America to supply our paper mills. At Mannheim on the Rhine the American importers have their ragpicking houses, where the rags are collected from all over Europe, the disease-infected Levant not excepted, and where women and children, too poor to earn a better living, work day after day, with wet sponges tied over their mouths, sorting these filthy scraps for shipment to New York. Our best papers are made of these rags and our common ones of wood pulp, which is obtained by grinding and macerating huge blocks from some of our soft-wooded forest trees. The bast papers, therefore, are a creation of the Orient and are more nearly related to the South Sea Island tapa than to any of our products.

To the fact that they are made from bark they owe their peculiar character. They are as a rule softer, silkier, tougher, and lighter than our papers. If wet, they lose their strength, like tissue paper, but on drying regain it. They are usually absorbent, and for this reason were considered in the olden days as very valuable in surgery.

THE WONDERFUL BAMBOO

The word bamboo suggests to most Americans a faithful fishing rod or a dainty fan. To the Japanese and Chinese, who are the most practical agriculturists in the world, and to the natives of tropical India and the Malay archipelago, it is as indispensable as the white pine to the American farmer. They are not only dependent upon it for much of their building material, but make their ropes, mats, kitchen utensils, and innumerable other articles out of it, and at the same time consider it among the most nutritious of their vegetables. Varieties of bamboo are found

A Well-kept Forest of Timber Bamboo (*Phyllostachys quilioi*)

A bamboo stem, or culm, attains its full height—40, 60, or 100 feet—in a single season. It is allowed to stand for 3 or 4 years before cutting in order that it may harden. The shining stem is hollow and is divided into joints or knots by the crossing of the vascular bundles of fibers. There are many varieties of the bamboo plant, from the species which is woven into mats to the tall bamboo tree which the Chinaman uses for the mast of his large boat. One variety is cultivated as a vegetable, and the young shoots eaten like asparagus, or they may be salted, pickled, or preserved.

The rapidity of growth of the bamboo is perhaps its most wonderful characteristic. There are actual records of a bamboo growing 3 feet in a single day, or at the rate of 1½ inches an hour. The shoot in this picture is 5 feet high, and twelve days old.

everywhere in Japan, even where there are heavy falls of snow in winter. It is a popular misconception that bamboos grow only in the Tropics. Japan is a land of bamboos, and yet where these plants grow it is not so warm in winter as it is in California. In regions where the snows are so heavy that they often break down the young stems and where the thermometer drops to 15° F. below the freezing point, the largest of the Japanese species grows and forms large groves. Some of these varieties could be grown commercially in the United States.

The bamboo groves of Japan are not only one of the most striking features of its landscapes but one of its most profitable plant cultures. The largest well-kept groves in the world, except perhaps those of Burma, are growing in the central provinces, and some of these are several square miles in area. These groves pay the owners good interest, often $50 gold per acre annually; Japan exports 10,000,000 fishing rods alone, the larger share of which come to the United States. There are many bamboos scattered throughout the United States in botanical gardens, where they are cultivated for ornamentation. There are also some beautiful groves of imported bamboo in California, but no serious attempt has yet been made to grow varieties having commercial value.

"Forest Fires in the Adirondacks in 1903," by H. M. Suter, shows that more than 600,000 acres of timberland were burned over in northern New York between April 20 and June, 1903. About $175,000 was spent in fighting the fires, which nevertheless were finally extinguished only by the help of heavy rains. The total direct loss was approximately $3,500,000. No less serious, though incapable of money valuation, is the indirect loss due to the destruction of young growth which was to form the future forest. To this must be added the injury to the forest soil caused by the burning out of the vegetable matter indispensable to healthy tree growth. The unprecedented damage was due to the long drought in April and May, which had so dried the forests that the fires swept through with fearful fury.

The report is convincing evidence of the necessity of establishing an Adirondack national reserve, if we would preserve the beauty of this region. The report is published by the Bureau of Forestry, and contains a large map of the region devastated.

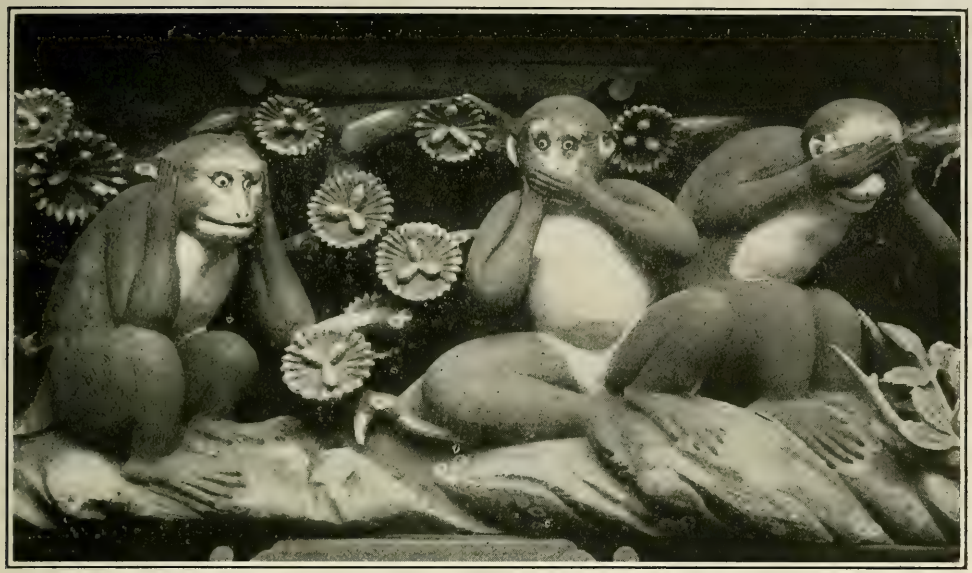


Photo from Alexander Graham Bell. Copyright, 1904, by the National Geographic Magazine

This Group of Monkeys Represent a Favorite Maxim of the Japanese, "Hear No Evil, See No Evil, Speak No Evil"

It is a wood carving on a door of the stable of one of the sacred horses at Nikko

INOCULATING THE GROUND

TO inoculate sterile ground and make it bring forth fruit in abundance is one of the latest achievements of American science. Some of man's most dread diseases—smallpox, diphtheria, plague, rabies—have been vanquished by inoculation, and now inoculation is to cure soil that has been worn out and make it fertile and productive again.

The germs that bring fertility are mailed by the Department of Agriculture in a small package like a yeast cake. The cake contains millions of dried germs. The farmer who receives the cake drops it into a barrel of clean water; the germs are revived and soon turn the water to a milky white. Seeds of clover, peas, alfalfa, or other leguminous plants that are then soaked in this milky preparation are endowed with marvelous strength. Land on which, for instance, the farmer with constant toil had obtained alfalfa only a few inches high, when planted with these inoculated seeds will produce alfalfa several feet high and so rich that the farmer does not recognize his crop.

It has been long known that repeated crops of wheat and grain gradually exhaust the nitrogen in the soil. Now, as all plants must have nitrogen, which in normal condition they absorb through their roots, this constant drain of nitrogen from the soil has so alarmed some persons that they have predicted a "nitrogen famine" to occur in 40 or 50 years, and they have very graphically

A Field of Vetch, Showing the Effect of Inoculation

The plat on the left was not inoculated, while that on the right was inoculated.

Even more startling than this picture is a comparison of the figures of yield of uninoculated and inoculated plots. Two patches of hairy vetch grown side by side under precisely the same conditions yielded crops as follows: Uninoculated patch, 581 pounds; inoculated patch, 4,501 pounds. Crimson clover under similar conditions yielded, uninoculated, 372 pounds; inoculated, 6,292 pounds. The difference in the amount of nitrogen obtained from the two crops was: hairy vetch, uninoculated, 7 pounds; hairy vetch, inoculated, 105.5 pounds; crimson clover, uninoculated, 4.3 pounds; crimson clover, inoculated, 143.7 pounds.

portrayed the possibilities of such a catastrophe. This view of the situation is greatly exaggerated, but the fact remains, nevertheless, that the main reason of once fertile lands becoming unproductive is loss of nitrogen in the soil.

The difficulty has been to get the nitrogen back into the ground. Fertilizers are expensive and not satisfactory; but there is an inexhaustible supply of free nitrogen in the air if it could be captured. The problem of how to utilize this free nitrogen has now been solved.

It was discovered some time ago that leguminous plants— clover, alfalfa, peas, etc.—were able to put back nitrogen into the soil and thus fertilize it. This is the reason why a wheatfield after a crop of alfalfa will yield a much heavier harvest. The plants absorb the free nitrogen by means of bacteria-tubercles growing on their roots, the tubercles varying

Tubercles of Velvet Bean Produced by Inoculation (Natural size)

The peculiar clusters on the roots are formed by innumerable minute bacteria. They absorb the free nitrogen in the air and put it back into the soil

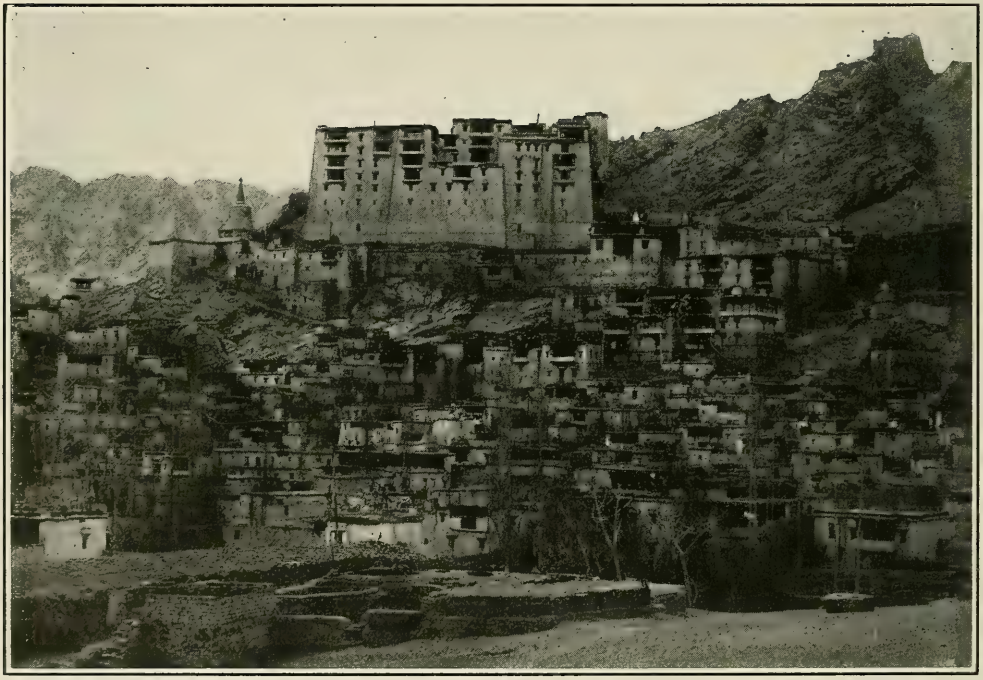
A fair average of the number of pounds of nitrogen added per acre to soil by leguminous crops is about 200 pounds, which, of course, is in addition to the large amount of nitrogen removed in the leguminous crop. This is what makes it so advisable to include a legume in any crop rotation, as the following crop gets the benefit of all the nitrogen left in the soil. The following list will give some idea of the gain in crops grown after legumes as compared with those grown upon the same kind of soil with fertilizers not containing nitrogen :

Cotton gained	372 pounds per acre	Oats	35.2 bushels
Potatoes	34.4 bushels	Wheat	8.3 bushels

in size from a pin-head, in the case of clover, to large clusters. Clover and beans possessing these tubercles will flourish in quartz sand after it has been heated to a red heat in order to drive out all nitrogen, while these plants without tubercles will not grow unless there is some nitrate in the soil. It was thus seen that if plants could be artificially presented with bacteria tubercles the plants would flourish in the poorest and thinnest soil.

The nitrogen-fixing bacteria in the tubercles were separated several years ago in Germany, but it remained for an American, Dr George T. Moore, of the Office of Pathological and Physiological Investigations of the Department of Agriculture, to devise a method by which these bacteria might be cultivated artificially in such form that their nitrogen-fixing power should be increased and be permanent and not evaporate. Great quantities of these germs are now being cultivated by the Department. Enough germs are sent in each little package to inoculate seeds for one or four acres. Each cake costs the government about two cents to manufacture, less than a cent an acre. Dr Moore's process has been patented by him, and has been by him generously deeded to the American people.

It must be clearly understood, however, that only seeds of leguminous plants—peas, alfalfa, beans, etc.—can be benefited by the nitrogen-fixing bacteria. Where the soil is rich and fertile, the crop is not appreciably increased by the use of the inoculating bacteria, but where the soil is poor, the harvest is increased many times.



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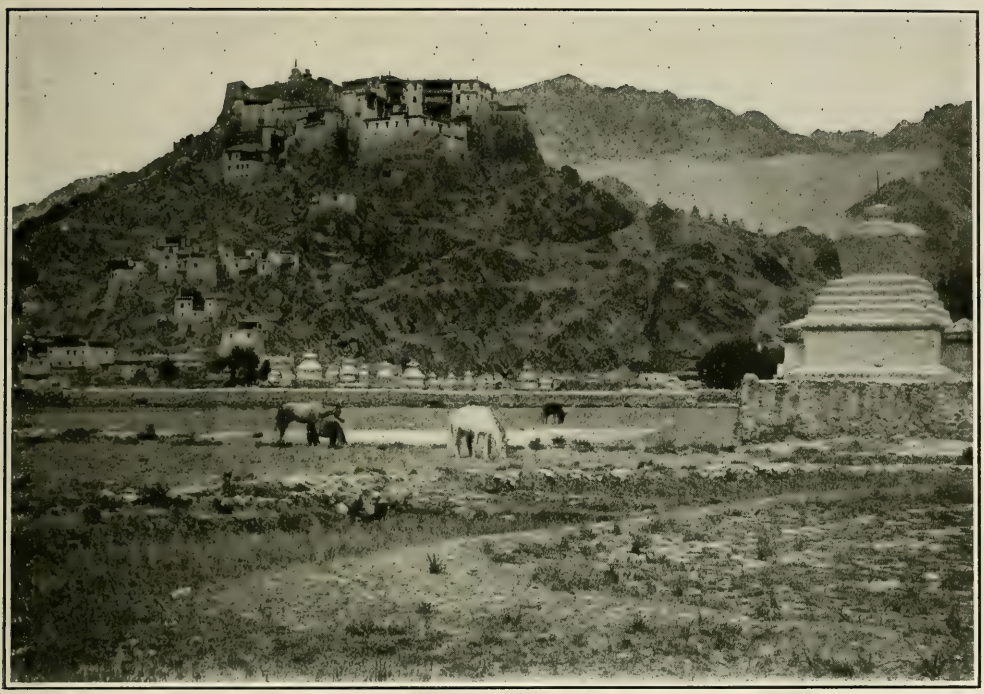
An Abandoned Monastery in Ladakh

Ladakh was originally a part of Tibet, then became independent, and in 1839 was annexed to Kashmir. The type of buildings is very similar to that of Lhasa



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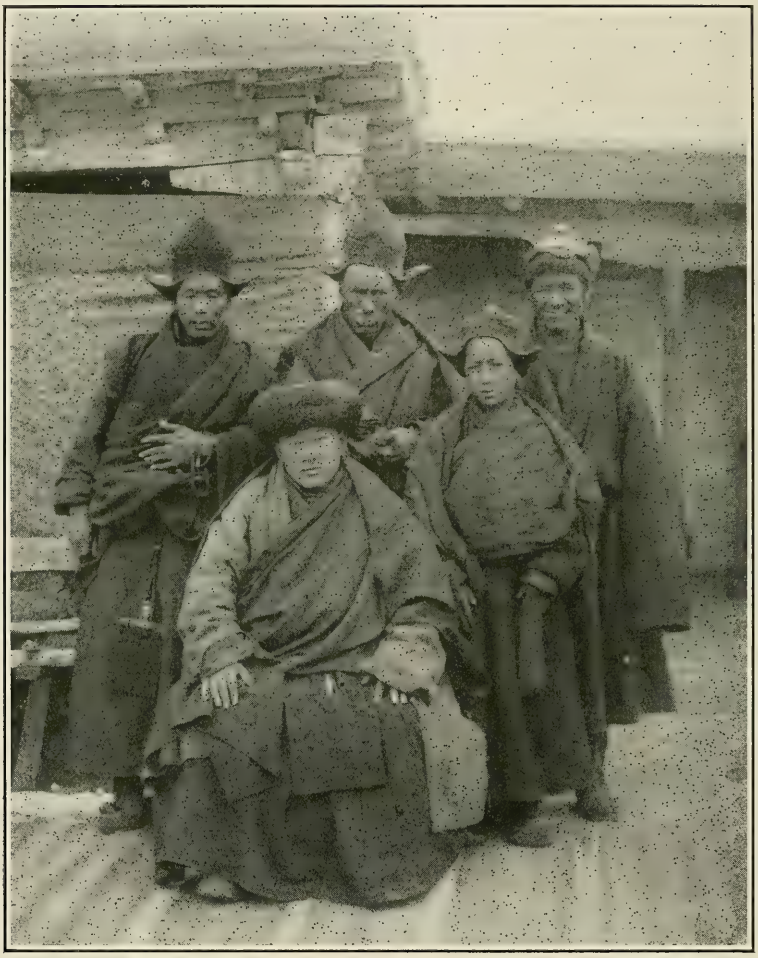
Another View of the Monastery at Ladakh

A massive native tombstone is seen in the right foreground and others at the base of the hill

THE CROSBY EXPEDITION TO TIBET

AT a recent meeting of the National Geographic Society Mr Oscar T. Crosby gave an interesting account of his journey through Chinese Turkestan and into Tibet in the fall of 1903. Mr Crosby left the railway at Andijan; thence he proceeded by caravan to Kashgar, Yarkand, Khotan, and Polu, which is situated at the foot of the Tibetan plateau. Here the real work he had planned—the ascent of the Kuenlun Mountains by an hitherto untraversed route—began. After much labor the party gained the plateau, but the zero temperature and biting winds at that height of 18,500 feet exhausted their horses and made their guides desert. Provisions failing, they called a halt and sent ahead for help. Fortunately, a party of wandering Kirghez met the messengers and conducted the whole party to the known country. They gained Ladakh, crossed the Himalayas, and struck the railway again. Speaking of the Tibetans, Mr Crosby said:

"We met with nothing but kindness wherever we went. The savagery and



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A Group of Lamas, Ladakh

hostility to strangers of the Tibetan people exist almost entirely in the imagination of novelists and unfriendly political writers. True, they do not desire the Western civilization and they resent the intrusion of white men in their domestic affairs. They are satisfied with their lot, and desire nothing better.

"The exclusiveness is more Chinese than Tibetan, for the Chinese exercise a wide influence in the country. They feel the incursion of foreigners into China has not been altogether happy in its results, and the tales the Chinese envoys and other representatives have told have alarmed the timid Tibetans and made them pitifully anxious to avoid the same fate.

"I have never felt there existed any real danger to England's sway in India

from a Russian descent across the Tibetan plateau; but it is not the Tibetan army, but its climatic and structural peculiarities, that would prevent it. My own experience has convinced me that no army of men unaccustomed to living in the high altitudes of the plateau could be maintained in that region. They could not live, and certainly they could not march on foot. The difficulties of transport are perfectly insuperable.

"As the expedition of Colonel Younghusband has demonstrated, it is much easier to get into Tibet from India than from Russia, and it has also shown what weak resistance the soldiers of the Grand Llama are able to offer any modern and well-disciplined force. Armed with matchlocks, swords and knives, and similar weapons of medieval warfare, they are as helpless as so many children with toy guns.

"Among the occasional travelers we met on the route were a Chinese merchant and his wife, both Mohammedans from Manchuria, and then engaged in making the holy pilgrimage to Mecca.

"They were mounted on the little mountain ponies, and had been already more than three months on their way. The end of their pilgrimage was at least five months ahead, but they were not discouraged, and went confidently and bravely on, the wife no less enthused than her husband, though she perhaps thought she was barred from the delights of Paradise, an entrance into which the man was to make certain by his pious zeal. We furnished them directions for their journey and all the help we could give—and they passed out of our sight across the snows."

Mr Crosby brought back some ancient manuscripts from the sand-buried ruins of Khotan. The manuscripts have not yet been deciphered, but they are pronounced exceedingly valuable. He has located the source of the Koraksh River and obtained new information regarding the mountain chains forming the northwestern boundary of Tibet.

GEOGRAPHIC NOTES

IS THE NEW IMMIGRATION DANGEROUS TO THE COUNTRY

THAT the Italians, Poles, and Huns who are entering the country by the hundred thousand are a source of wealth and progress for the United States instead of becoming a burden and a danger, as so often argued, is the conclusion of Hon. O. P. Austin, expressed in an article in the *North American Review* for April. Since 1789, 22,000,000 immigrants have joined us, of whom ten and a half million are now living. Of this grand total 5,000,000 have come from Germany, 4,000,000 from Ireland, 2,750,000 from England, 2,000,000 from Canada, and 1,500,000 each from Italy, Austria-Hungary, Russia, Norway, and Sweden.

The latest statistics show that the so-called "objectionable" class, instead of leading in the number of criminals and paupers, gives the United States a much smaller proportion of disreputable characters. A comparison based upon the census of 1890, the latest available figures on crime and dependency, shows that per each million of the different foreign-born elements, there are in prisons and benevolent institutions, etc., of Poles, 4,580; Austrians, 4,805; Russians, 5,202; Germans, 5,662; Hungarians, 6,792; English, 7,160; Scotch, 7,288; Italians, 9,877; French, 10,864; Irish, 16,624.

Foreign born parents are more particular to send their children to school, and as a consequence the children of foreign born show a better percentage of literacy than the children of native born.

Though immigrants are coming in greater numbers, relatively to our total population they are fewer than they were some decades ago. The percentage of our foreign-born population is at present less than at any time during the last fifty years, with the exception of 1880. It is now 13.6, which shows that we can give them at least the same degree of assimilation.

The importance of this element as a factor in the development of the country and the creation of wealth is discussed at considerable length. The "objectionable" class are almost entirely located in those states which have the greatest *per capita* of created wealth, and study shows that they are a most important factor in the production of this wealth. Twelve states—New York, New Jersey, Pennsylvania, Connecticut, Massachusetts, Ohio, Illinois, Iowa, Michigan, Wisconsin, Minnesota, and California—possess 81 per cent of the "objectionable" immigrants that have come to this country. These same states have received also 78 per cent of all the immigrants, and have nevertheless only one-half of the population of the United States. The foreign-born population of these twelve states averages 21 per cent, while the foreign population of the rest of the United States averages only 6 per cent. Notwithstanding the floods of immigrants of recent years, the *per capita* created wealth in these twelve states is $179.31, while in the others it averages only $119.98. Three-fifths of the nation's wealth are in these states.

The Bureau of Statistics is publishing a series of special reports from our consuls in Europe on the emigration from the various countries.

OUR PRESENT POPULATION

THE Census Bureau estimate of 79,900,389 for the population of the United States on June 1, 1903, seems conservative and is probably at least one million short of the actual number. The increase during the three years by this estimate is 3,905,814. Inasmuch as during the three years the rush of immigrants was enormous, reaching over 1,900,000, this estimate implies that our natural increase by excess of births over deaths has been only 2,000,000. This amounts to about .009 per cent natural increase per year. Our natural rate of increase for the decade 1890–1900 averaged nearly twice as much—.0157. If our natural increase has continued at this same rate—and there is little reason to believe it has appreciably diminished during the three years—we have had an excess of births over deaths of 3,572,000, which would make our total population on June 1, 1903, 81,472,000.

The Census Bureau will hereafter make annual estimates of our population based upon what is known as the arithmetical method.

"This rests upon the assumption that the annual increase for each year since the last census will be one-tenth of the decennial increase between the last two censuses. The country as a whole and most of the states and cities are growing with a steadily decreasing percentage of increase. As this condition has obtained in the United States for the last twenty years, it is likely to hold good in the immediate future. Under such conditions the arithmetical method has been proved more accurate than any alternative method."

PAN-AMERICAN RAILWAY

MORE than one-half of the all-rail route between New York and Buenos Ayres has been constructed, according to the report of Charles M.

Pepper, the Pan-American Railway Commissioner. The all-rail line will be 10,228 miles long if completed by the route selected and announced by the Intercontinental Railroad Commission in 1899, and it will cost $150,000,000 to construct the 4,800 miles now lacking. Mr Pepper's report is published as a Senate document, and gives many facts showing the present prosperity enjoyed by the majority of the South American republics. During the past five years 656 miles of the Pan-American route have been built, but without direct reference to the Intercontinental project. The Chilean government has contracted to pierce the Andes with a tunnel to connect with the Buenos Ayres line, so within several years cars will be running between Valparaiso and that city. Chile is also seriously considering building a railway parallel to her coast from Santiago to Iquique.

The Argentine Republic is extending her lines northward into Bolivia as far as Tupiza, by treaty with Bolivia. The Argentine system of railways, 11,360 miles in all, represents an investment of one-half billion of dollars, on which the roads netted 3.71 per cent last year. The Peruvian Congress has established a permanent railway guaranty fund of $1,000,000 annually out of the proceeds of the tobacco tax. Mexico is extending her lines southward; they will soon reach the Guatemalan border. In Central America, Guatemala and Costa Rica have each nearly completed the trunk lines which are to connect their Atlantic and Pacific coasts. Brazil has undertaken to build within four years a railroad from Santo Antonio around the Maderia Falls to the Mamore. The length will be about 300 miles. This railway line will insure the benefit of rail and water communication to the great region tributary to the Amazon. All these railways will be feeders of the great through line. The report contains a large map of the Intercontinental railway.

MAP OF THE UNITED STATES

MANY inquiries have been received by this Magazine for a good wall map of the United States. The most serviceable map is one published by the General Land Office, 5 x 7 feet. The map is in seven colors, is in considerable detail, and contains insert maps of Alaska, the Philippines, Hawaii, Samoa, Guam, Porto Rico, and Cuba. The map also shows the successive additions to our territory. It is backed with cloth and mounted on rollers, all ready to hang on the wall. The Land Office sells one map only to each applicant for 80 cents, the actual cost of printing and paper.

THE CARNEGIE INSTITUTION

THE Carnegie Institution has recently inaugurated two new lines of geographic work whose importance and value will be far reaching. Each work is outside the sphere of the national government, and each also has been too expensive to be undertaken by a private purse.

A large annual grant has been made for the exploration of the South Pacific islands and ocean floor, extending from the Galapagos Islands, west of Ecuador, to the Philippines. The work is under the charge of Alexander Agassiz and it is expected will require ten years for completion. It is undoubtedly the most important geographic enterprise undertaken by any nation for many years. The groups to be examined are Massason, the Society, the Paumotus, the Marquesas, the Cook, Samoa, Fiji, the Elice group, Marshall, and Carolines. The explorations will not be confined to land, but will include much deep-sea dredging between the archipelagos in order to obtain some idea of the contrast or affinities between the insular oceanic faunæ and the Pacific deep-water faunæ. It is imperative that the islands be studied at once, before their isolation is entirely gone and their individual characteristics modified.

A generous grant has been made to establish a "Department of International Research in Terrestrial Magnetism," to be under the direction of Dr L. A. Bauer. The magnetic storms that have swept around the globe so frequently of late, notably on the occasion of the eruption of Mont Pelée, and again in the fall of 1903, when the storm was so violent in the United States that telegraph communication was for a time interrupted, have excited much attention, but our knowledge of the earth's magnetism is so meager that the cause or origin of these storms can not be explained. Some of the problems which Dr Bauer hopes the new department will be able to investigate are: a magnetic survey of ocean areas and unexplored regions, international observations of the variations, observations in ocean depths and atmospheric regions, the correlation of magnetic and electric disturbances with meteorological phenomena, etc. Dr Bauer will continue at the head of the magnetic division of the U. S. Coast and Geodetic Survey.

TWENTY-FIFTH ANNIVERSARY OF THE U. S. GEOLOGICAL SURVEY

ABOUT one-third of the United States, 929,712 square miles in all, exclusive of Alaska, have been surveyed and mapped by the Geological Survey since its formation in 1879. The Survey is now sending out each year 260,000 volumes, 45,000 geologic folios, and 450,000 maps. It receives an annual appropriation from Congress of $1,500,000.

The detailed map of the United States which the Survey is making is the greatest topographic work in magnitude and detail ever attempted by any government. The earlier reconnaissance surveys were relatively inexpensive, the average cost varying from two to four dollars per square mile. The surveys executed between 1884 and 1890 varied in cost from three to seven dollars per square mile. The more accurate maps now made on the larger standard scale of 1 mile to 1 inch vary in cost between ten and twenty-five dollars per square mile, depending upon the character of the topography, the amount of settlement, of woods, etc.

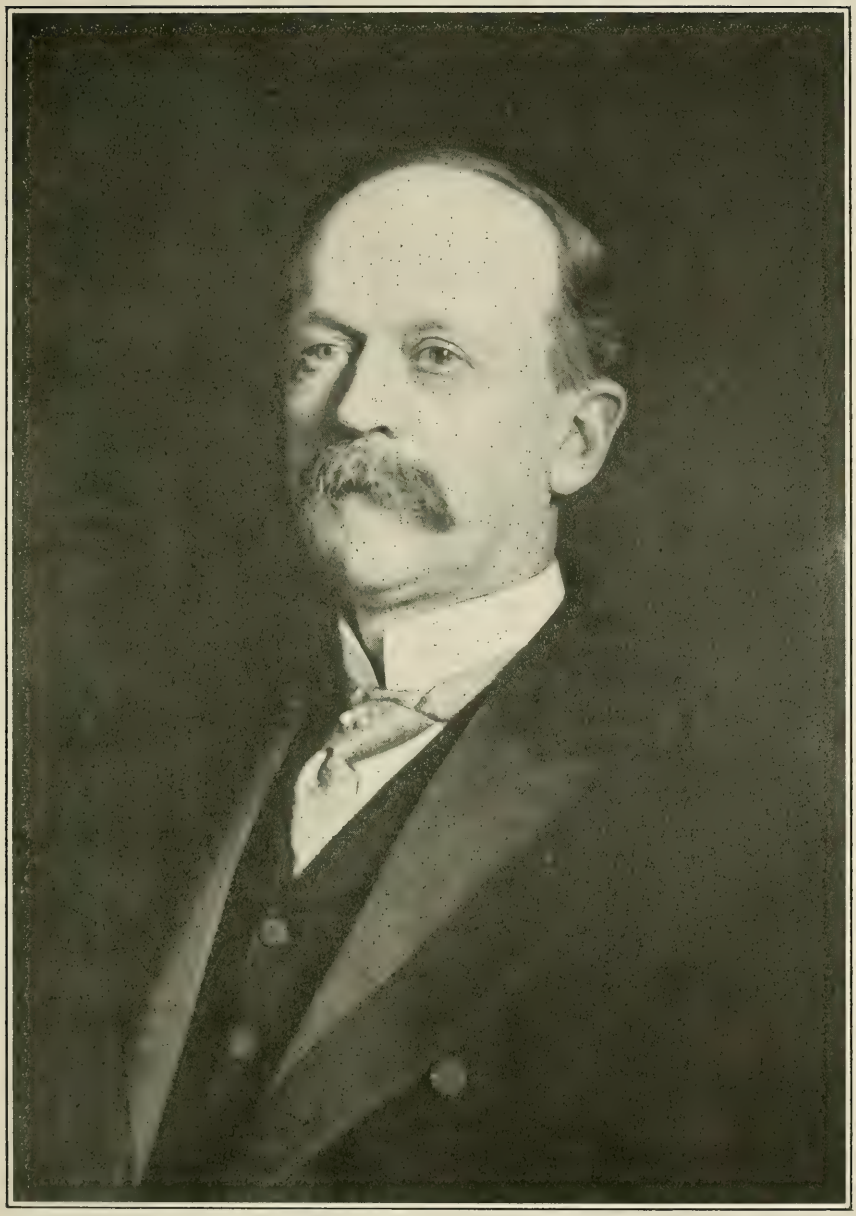
The mapping is, however, but a fraction of the Survey's present work. There are many other big tasks with which it is charged—the geologic survey of the United States; the exploration of Alaska; the reclamation of the West, involving the investment of over $20,000,000 of federal money in irrigation works; the examination and report on new gold, copper, coal, oil, and other mineral deposits, involving the investment of many millions of private capital, and the many branches of profound scientific research upon which most of the practical results depend.

On April 2 the Geological Survey celebrated the twenty-fifth anniversary of its formation by a dinner in Washington attended by over 300 members of the Survey. Col. H. C. Rizer acted as toastmaster. Speeches were made by Speaker Cannon, Secretary of the Interior Hitchcock, Director Charles D. Walcott, and Dr C. Willard Hayes.

Others who responded to toasts were G. K. Gilbert, "Scientific Work of the Survey;" S. F. Emmons, "Economic Work of the Survey;" Henry Gannett, "Topographic Work;" F. H. Newell, "Hydrographic Work;" J. F. Kemp, of the Columbia University, New York, "Geologists in Outlying Districts," and George Otis Smith, "The Younger Generation in the Survey."

SUMMER SCHOOL OF GEOGRAPHY AND GEOLOGY AT CORNELL UNIVERSITY

IN 1903 Cornell University started the original experiment of a summer school of geography, physiography, and geology, designed principally for teachers who might wish to combine field



Hon. Charles D. Walcott, Director of the U. S. Geological Survey since 1894 and Secretary of the Carnegie Institution

On April 2 the Geological Survey celebrated the twenty-fifth anniversity of its formation

and laboratory exercises with good lectures. The school proved a great success. Teachers came from seventeen different states, including superintendents, principals, normal-school teachers, teachers in the high schools and in every grade where geography is taught.

The University has wisely decided to continue the school during the summer of 1904. This year, as last, it will be conducted by Prof. Ralph S. Tarr, with an able corps of assistants—Professors A. P. Brigham, Charles A. McMurry, Philip Emerson, Frank Carney, Ray Hughes Whitbeck, George D. Hubbard, F. V. Emerson, and B. S. Butler.

A more instructive location from a geographical point of view could not be chosen than the site of Cornell University. Situated on a hillside overlooking a large lake in one direction and broad, beautifully sloping valleys in the other, and bounded by narrow gorges with many falls, cascades, and rapids, the campus is the center of a great variety of beautiful, interesting, and instructive geographic features.

The connection of the school with a large university gives it many advantages. The university library is fully supplied with books and magazines on geologic and geographic subjects, and these are accessible to the students in the school. The laboratories are equipped with many models, maps, photographs and specimens illustrating phases of geology, physiography, and geography. There is, furthermore, a collection of fully 5,000 lantern slides for use in the lecture courses, so that it is possible to bring into the class-room clear illustrations of almost every topic that needs illustration.

GIRDLING THE GLOBE

REAR ADMIRAL C. M. CHESTER sends this Magazine the following note written by Prof. Otto Klotz, of Ottawa, at Adelaide, Australia, concerning the latter's work in girdling the globe astronomically :

"The Dominion of Canada has undertaken, on her own initiative, and entirely at her own cost, the work of girdling the globe astronomically. This has been made possible by the completion of the Pacific cable. Canada has carried the work from Greenwich, which is the first meridian of the British world, across the Atlantic, across Canada to Vancouver, where it connects with the Pacific cable From there it goes by Fanning Island to Fiji, to Norfolk Island, and then, at Southport, near Brisbane, to Australia. The work was thence continued to Sydney, where it joined the longitude carried from Greenwich eastward via Suez, Madras, and Singapore to Port Darwin, and thence to Adelaide, Melbourne, and Sydney.

"I also visited New Zealand, and tied that prosperous colony to the girdle, the cable connection being from Norfolk Island to Doubtless Bay, and thence by land lines to the observatory at Wellington.

"The result of the work in which I am now engaged is of special value to the whole of the Pacific, for the determination of the position of the islands. Furthermore, it will be of considerable scientific interest, and besides, being the 'all red' line, is a further link in binding the various parts of the British Empire together. Canada, I may say, takes special pride in undertaking the work, considered in its imperial aspect. She has not invited the assistance of other parts of the Empire, although the result of the work will be of even greater value, as to the Pacific islands, for instance, than to herself. She is carrying it out by herself, with the object of contributing to the general good."

For the map of Alaska that is published as a Supplement to this number the NATIONAL GEOGRAPHIC MAGAZINE is indebted to the U. S. Geological Survey and in particular to Alfred H. Brooks, Chief of the Alaskan Division, and S. J. Kübel, Chief of the Engraving and Printing Division. An interesting feature of the map is the small key in the upper right-hand corner, which shows what sections of the territory have been surveyed.

A Favorable Report on the feasibility of a canal connecting the waters of the Baltic and Black seas has been submitted to the Czar by W. von Ruckteschell, the engineer specially appointed

to examine the project for the Russian Government. M. von Ruckteschell says that a waterway large enough for vessels drawing 31.5 feet could be built for $180,000,000 between Riga and Cherson. Of actual canals only 66 miles to connect the western Dvina and Dnieper rivers will have to be excavated. The length of this interior waterway will be 1,468 miles. The Dvina is used for 330 miles and the Dnieper for 1,072 miles. Such a canal would permit warships to go from the Baltic to the Black seas in seven days, while vessels now require several weeks for the voyage via Gibraltar. An interesting description of the proposed waterway is given by Ethelbert Watts, Consul General to St Petersburg, in Daily Consular Reports, No. 1911, March 26.

GEOGRAPHIC LITERATURE

Greater Russia. By Wirt Gerrare. Illustrated. Pp. viii + 337. 6 x 9 inches. The Macmillan Company. New York: 1904. $3.00.

This volume, reprinted from the edition of 1902, makes an excellent supplement to Senator Beveridge's "The Russian Advance;" Mr Gerrare goes considerably more into detail in his descriptions of Siberian towns, life, and commerce.

"There has been a great awakening of Russia. The people, debarred generally from active participation in politics, have directed their energies toward the commercial and industrial exploitation of their native land. They are active, strenuous, and persevering; they have advanced in civilization as well as increased their wealth and power."

"East of Baikal is Russia's greater and better half, because that land has been influenced from the west by way of the cosmopolitan Far East." The book contains a fine map of Manchuria and Korea and nearly a hundred illustrations.

Early Western Travels, 1748-1846. By Reuben Gold Thwaites. Vol. I. Illustrated. Pp. 328. 6½ x 9½ inches. Cleveland, Ohio. Arthur H. Clark Company. 1904.

The first volume in this valuable series includes: The journals of Conrad Weiser in 1748, giving an account of the first official journey undertaken by the English colonists west of the Alleghenies; the journals of George Groghan (1750–1765), giving an epitome of the Indian history of the period; the journals of Capt. C. F. Post of two trips from Philadelphia to the Indians of the Ohio, and the journal of Capt. Thomas Morris, who accompanied General Bradstreet (1764) on the latter's expedition toward Detroit. Professor Thwaites and the Arthur H. Clark Company, publishers, are doing a great service in bringing to light these personal narratives of early American exploration.

From Paris to New York by Land. By Harry De Windt. With 2 maps and 90 illustrations. Pp. 310. 5½ x 9 inches. New York: F. Warne & Co. 1904. $3.00 *net.*

The 90 illustrations of this volume form the best part of it and are alone worth the price of the book. The narrative is superficial and becomes tiresome because of the monotony of "hunger and filth" which the author endured and which he is constantly describing. As the journey from Paris to New York by land has been accomplished by no one else, and as it required much pluck and perseverance, it is unfortunate that Mr De Windt has not given the world a more valuable record.

ARTICLES FROM APRIL MAGAZINES

The Great Siberian Railway, James W. Davidson, F. R. G. S. Century Magazine.

The Two Pacifics, Harold Bolce. Booklovers' Magazine.

The Bahamas and the Caribbees, Amos Kidder Fiske. Chautauquan.

Russia's Civilizing Work in Asia, G. Frederick Wright. Review of Reviews.

Panama Commission and its Work, Walter Wellman. Review of Reviews.

Yellow-Pine Industry in the South, W. Watson Davis. Review of Reviews.

Industrial Future of Chile in Connection with the Panama Canal, G. Fred Collins. Engineering Magazine.

Coalfields of Crow's Nest Pass, British Columbia, E. Jacobs. Engineering Magazine.

Home Life of Our Birds, James Rollin Slonaker. The World To-day.

The Great River. IV. William Garrott Brown. The World To day.

Forestry Problems of the United States, B. E. Fernow. Pearson's Magazine.

Many interesting articles relating to the geography of the United States and of foreign countries are appearing in the "World's Fair Bulletin," published monthly in the interest of the Louisiana Purchase Exposition, at 317 N. Third street, St Louis.

From Harbin to Mukden, Col. De La Poer Beresford. Fortnightly Review.

Spain Yesterday and Today, L. Higgin. Fortnightly Review.

Whaling in Hudson Bay, P. T. McGrath. New England.

The Mexican Hacienda, Its Places and People, George F. Paul. New England.

The Homes of the World, Martin Craft. Outdoors.

Salmon Fishing in Western Newfoundland, L. F. Brown. Outdoors.

Rise of Modern Japan, Jihei Hashiguchi. World's Work.

Our Trade in the War Zone, O. P. Austin. World's Work.

Highest Railway in Europe (Thusis to St Moritz), Enrica Bignami. Cassier's.

Highest on Mt McKinley, R. L. Dunn. Outing.

Untraveled Russia, J. B. Thomas. Outing.

Through Inland Seas (Great Lakes), L. M. Sill. Harpers.

The Sicilian Highlands, William Sharp. Atlantic.

Present Situation in Persian Gulf, E. Cotes. Contemporary Review.

The Great West and Two Easts, H. E. Reed. North American.

Is the New Immigration Dangerous to the Country, O. P. Austin. North American.

The Caucasian in Brazil, T. C. Dawson. Popular Science Monthly.

The Air of Luray Caverns, G. L. Hunner. Popular Science Monthly.

The Atlantic River (Gulf Stream), J. Drake. Strand.

A Cruise Among the Cannibal Islands, A. H. Burgoyne. Pall Mall.

The Ascent of the North Palisades, J. N. Le Conte. Sierra Club Bulletin.

Variations of Sierra Glaciers, G. K. Gilbert. Do.

How Private Burns Climbed Mt Pinatúbo, N. F. McClure. Do.

The Hillside Farmer and the Forest, George Hansen. Do.

The Notable Mountaineering of the Sierra Club in 1903, E. T. Parsons. Do.

On the Trail with the Sierra Club, W. F. Badè. Do.

BOOKS RECEIVED

Japan Today. By James A. B. Scherer, Ph. D. Illustrated. Pp. 323. 5½ by 7½ inches. Philadelphia: J. B. Lippincott Company. 1904.

The Non-metallic Minerals: Their occurrence and uses. By George P. Merrill. Illustrated. Pp. xi + 407. 6 by 9 inches. New York: John Wiley & Sons. 1904. $4.00 *net.*

The Arapahoe Sun Dance: The ceremony of the Offerings Lodge. By George A. Dorsey. Pp. xii + 228. 6½ by 8½ inches. With 137 full-page plates. Chicago: Field Columbian Museum. Anthropological series. Publication 75. Volume IV. 1903.

Elementary Geography. By R. E. Dodge. Profusely illustrated. Pp. 230. 8 by 10 inches. Chicago: Rand, McNally Co. 1904. 75 cents.

Rocky Mountain Exploration. By R. G. Thwaites. With maps and illustrations. Pp. 276. 5½ by 7½ inches. New York: D. Appleton & Co. 1904. $1.25 *net.*

Voyages du Ch. Alex. Lesueur dans L'Amerique du Nord (1815–1817). By E. T. Hamy. Illustrated. Pp. 108. 9 by 11 inches. Paris: Au Siège de la Société des Américanistes. 1904.

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The Geography of the United States. Professor BRIGHAM.

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Geographic Influences and Relations. Mr R. H. WHITBECK (Supervisor State Normal and Model Schools, Trenton, N. J.).

The Geography of Tropical Countries. Mr Hubbard.

Commercial Geography. *Lectures* and *Laboratory* and *Field Work*—Mr PHILIP EMERSON (Cobbet School, Lynn, Mass.).

Home Geography. Professor CHARLES A. MCMURRY (Director of Practice Department, Northern Illinois Normal School, De Kalb, Ill.).

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THE WORK OF THE BUREAU OF INSULAR AFFAIRS*

BY COLONEL CLARENCE R. EDWARDS, U. S. ARMY,

CHIEF OF BUREAU OF INSULAR AFFAIRS

IN the month of August, 1898, after the capitulation of the Spanish forces at Santiago de Cuba, the War Department was brought face to face with a unique problem, *i. e.*, the establishment of a properly qualified civil government under military control in the surrendered territory—a territory that speedily included Cuba, Porto Rico, and the Philippine Archipelago. The functions of an organized government, in harmony with American methods, had to be established in an unpromising field.

Officers of the Army were, as a rule, placed in charge, and they became, therefore, for the time being, civil servants; collected taxes, governed municipalities, enforced sanitary measures, established schools, adjusted claims, and, in short, performed almost every function of civil government. In a day, almost, they were called upon to govern more than twice as many people as inhabited the United States at the close of the Revolution.

The War Department found itself without adequate machinery to handle this new work. Its bureaus were restricted to military requirements, while the new conditions extended to all classes of governmental affairs.

The most important business which presented itself to the Department immediately after the organization of Santiago was the collection and disbursement of customs revenues. On August 23, 1898, the Secretary of War directed that all matters relating to the customs duties and taxes to be levied and collected as a military contribution upon the occupation and possession of any ports and places by the forces of the United States, under the several orders of the President, as published by the War Department, should be referred to the Assistant Secretary of War for his consideration and report.

The Chief Clerk of the War Department states that, for the sake of ready reference, the first of the Cuban customs cases that reached his desk were

* An address to the National Geographic Society, January 22, 1904.

filed in the long established record division. When several cases had accumulated he placed them in an empty file box on his desk. Papers of this nature and allied subjects accumulated so rapidly that the services of one clerk were granted to record these matters, which force was soon found to be inadequate to even enter them; therefore a few additional clerks were secured.

A translation of the Spanish tariff in force in the Island of Cuba was speedily prepared. Certain needed modifications were made in its provisions, and, under the supervision of an American customs expert, placed in operation at Santiago and other provinces as evacuated by the Spanish. A similar course of procedure was followed in Porto Rico after the withdrawal of the Spanish forces, as was also the case in the Philippines, and the large and increasing business in customs affairs drifted naturally to the same place.

The questions which arose in the new customs service during the first few months made evident the need for a new office, and this was emphasized as the time approached for the transfer of the entire Island of Cuba to our control, and our anticipated sovereignty over the Island of Porto Rico, on January 1, 1899. On December 13, 1898, by order of the Acting Secretary of War, there was created in the office of the Secretary of War the "Division of Customs and Insular Affairs." One distinct class, at that time supreme, was indicated by the word "customs." Other phases of civil affairs were embraced by the word "insular." To this new division were charged, without other record, all papers relating to the customs of Cuba, Porto Rico, and the Philippine Islands, as well as all civil affairs as distinguished from purely military matters, for final disposition. At this time there were but four clerks assigned to the records of the division at its creation, with orders to "keep them as you think best."

Up to February 10, 1900, one of the clerks was in charge, on which date the speaker reported to the Assistant Secretary of War and was assigned as chief. From this time the work, which had been steadily growing, increased by leaps and bounds, embracing many questions which the Secretary of War desired to bring to the attention of the Cabinet, so great was their importance. About May of the same year the division reported directly to the Secretary, and from that date the business of the division has had the personal supervision of that master mind of constructive statesmanship.

The Bureau of Insular Affairs takes pardonable pride in the first official comment made of its work by the Secretary of War in his annual report, dated November 27, 1901. It really is the best summary of the work up to that time accomplished by the office, as well as a statement of the conditions necessitating its creation. I will therefore take the liberty of quoting it in full.

"General policy of government.—The policy followed by the American Executive in dealing with the government of the Philippines (and also in dealing with the government of the other islands ceded or yielded by Spain which have been under the control of the War Department) has been to determine and prescribe the framework of the insular government; to lay down the rules of policy to be followed upon the great questions of government as they are foreseen or arise; to obtain the best and ablest men possible for insular officers; to distribute and define their powers, and then to hold them responsible for the conduct of government in the islands with the least possible interference from Washington.

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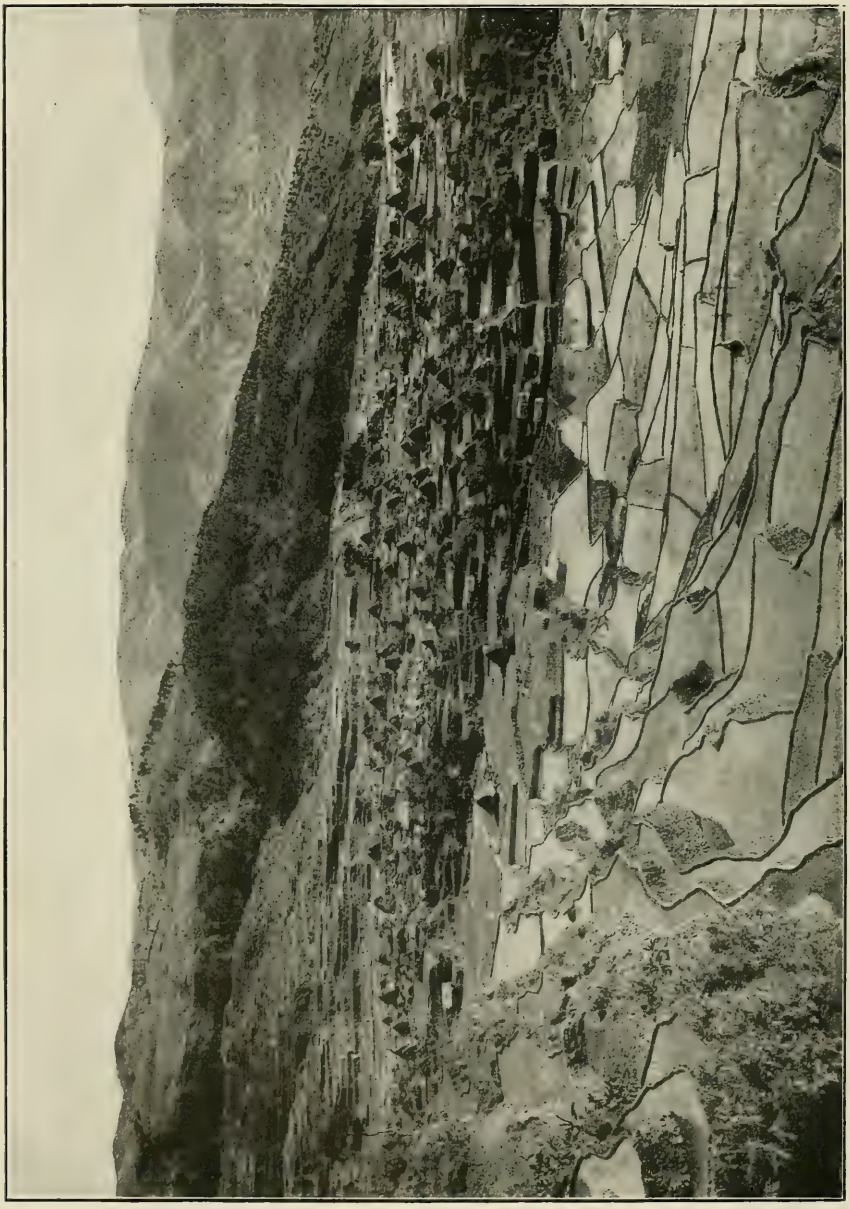


IGORROTE VILLAGE AND TERRACES FOR RICE PLANTING.

been constant and imperative. Different civilizations, different systems of law and procedure, and different modes of thought brought into contact have evolved a great crowd of difficult questions for determination. New facts ascertained and changed conditions have called for the interpretation and application of our own rules of policy and the establishment of further rules. Different views as to the scope of authority under the distribution of powers have required reconciliation. The application of the law of military occupation to rights and practices existing under the laws of Spain and the process of overturning inveterate wrongs have brought about frequent appeals to the highest authority, which, being in the name of justice, have required consideration. The work undertaken has been the building up of government from the foundation upon unfamiliar ground. We have had no precedents, save the simple and meager proceedings under the occupation of California and New Mexico, more than half a century ago, and it has been necessary to decide every question upon its own merits and to make our own precedents for the future.

"For the performance of all these duties full and accurate knowledge of the conditions and proceedings of all the governments in all the islands on the part of the authorities in Washington has been required. It has been necessary to follow them step by step. The President and Congress have looked to the War Department for information as to how the trust of government in the various islands was being performed, and tens of thousands of applications by the people of the United States for every conceivable kind of information regarding the islands have poured into the Department in an uninterrupted stream.

"Only thorough system could arrange, record, and keep available for use the vast and heterogeneous mass of reports and letters and documents which this business has involved, furnish answers to the questions, conduct the correspondence, and keep the Secretary of War from being overwhelmed in hopeless confusion. The War Department had no machinery for the purpose. No provision for any such administrative machine was made by law. Of necessity, by the detail of officers and the employment of the temporary clerks authorized by law, such machinery has been created in the Department with a chief, an assistant chief, a law officer, a competent force of translators, accountants, stenographers, and recording and indexing and copying clerks. It is called the *Division of Insular Affairs of the War Department*, and it performs with admirable and constantly increasing efficiency the great variety of duties which in other countries would be described as belonging to a colonial office, and would be performed by a much more pretentious establishment."

This annual report of the Secretary of War was followed by recommendations which undoubtedly resulted in the following provision of "An act temporarily to provide for the administration of the affairs of civil government in the Philippine Islands, and for other purposes," approved July 1, 1902.

"SECTION 87. That the Division of Insular Affairs of the War Department, organized by the Secretary of War, is hereby continued until otherwise provided, and shall hereafter be known as the *Bureau of Insular Affairs of the War Department*. The business assigned to said Bureau shall embrace all matters pertaining to civil government in the island possessions of the United States subject to the jurisdiction of the War Department; and the Secretary of War is hereby authorized to detail an officer of the Army whom he may consider especially well qualified, to act under the authority of the Secretary of War as the Chief of said Bureau; and said officer

while acting under said detail shall have the rank, pay, and allowances of a colonel."

The Division of Insular Affairs, therefore, on July 1, 1902, became the Bureau of Insular Affairs of the War Department, and the Secretary of War in pursuance of the above authority detailed the speaker as chief.

Organization and Personnel.—The organization of this Bureau has been changed from time to time to meet the constantly changing conditions which the daily necessities demanded and has now been worked out into a permanent organization consisting of the following divisions: Correspondence, Record, Compilation and Cuban Records, Statistical, Accounting, Philippine Insurgent Captured Records, and the Purchasing and Disbursing Division. To this last Division is also attached the Philippine purchasing agency, or office, in New York, comprising a force of ten employés. This last force is paid out of Philippine revenues, while the force of the Bureau proper is paid out of United States funds, in the form of three separate lump appropriations of Congress. The present legislative appropriation bill, however, places this Bureau on a permanent basis by providing for a statutory classification of its various employés. The present force of the Bureau, which has been reduced, and which has accomplished the work, is composed of one law officer and a force of seventy-five employés, with the addition of an army officer temporarily detailed.

The Bureau of Insular Affairs is hard to define. It may be called a clearing-house for all questions as between the government of the Philippine Islands and the government of the United States. It is by the act above quoted a federal instrumentality of the United States and the representative in this country upon which the government of the Philippine Islands relies, through the Secretary of War, for proper presentation to Congress of all legislative requirements of the Philippine Islands, as well as to do those things in the United States required by the Philippine Islands of the governmental agency in the mother country.

As Mr Root has shown in the quotation above made from his report, the government of the Philippine Islands is in the Philippines, composed of men selected by the Administration for merit alone to govern under the broadest constitutional limitations, agreeable by analogy to the essential principles upon which our own government is established.

The study of successful colonial governments, especially of those far separated from the mother country, as in the present case of the Philippine Islands—some 10,000 miles away—shows they have been generally administered by a separate department of the home government. It will be admitted, I assume, by any one who has given thought to the subject, that if the government of the Philippine Islands was put in leading strings and the various divisions of the Philippine Government administration assigned to the different executive departments in this country, friction would ensue; that the entity created in the Philippines would be disturbed, and that comprehensive development would not be practicable.

This policy has been recognized by the Administration that has had to do with the question of territory in the Orient, and the affairs of that government happen to be in the Bureau of Insular Affairs, which in turn, by a natural force of circumstances, happens to be in the War Department. I say natural, as the present civil government of the Philippines was made possible only by the admirable temporary civil administration of the military.

This transition from military to civil government was gradual, but took place

TEOSINTE READY FOR FIFTH CUTTING.

At the Malate experiment station marked success has been obtained in growing teosinte, one of the most valuable and productive of forage plants known. In general appearance it resembles Indian corn, with which it is closely related botanically, but, unlike corn, it produces many shoots from a single seed. Thirty or forty shoots have been counted growing from a single seed. A small plot of teosinte, planted January 6, gave five cuttings between March 21 and August 10, the growth at the last cutting being nearly 6 feet high and yielding at the rate of 16 tons of green fodder per acre. The total yield of green feed for the plot during the 4½ months specified was 49½ tons per acre, selling for $10 gold per ton. On well-fertilized ground and under proper management the Bureau of Agriculture states that during the year an acre should yield at least 100 tons.

The plant also matures its seed in the Philippines. The first experiments at seed production yielded at the rate of 800 pounds of thoroughly cleaned seed per acre, and this was secured during the dry season. Two and probably three crops of seed can be grown on the same ground during the year, which at the same rate for each crop, and at the prevailing prices for the seed, would give a return for seed alone of $1,440 gold per acre.

VINTA OR MORO SAILING BOAT, WITH SAMAL MAN.

as fast as it possibly could. Nothing could have been more fortunate than that, during the period of dual administration by the military and by the civil commission, or rather the gradual transition from the former to the latter, the lines of control of each reached the hands of one man in the War Department. Secretary Root possessed the power and authority and a definite object in view which we can justly say is today an accomplished fact in the Philippines.

The act of July 1, 1902, providing for the civil government in the Philippines, ratifies and confirms what we call the constitution of the Philippines—the Magna Charta given to the Philippine people by President McKinley, drafted by Secretary Root; in other words, the instructions of the President of April 7, 1900, to the Secretary of War for the Taft Commission. This act furthermore gives the necessary congressional authority to all functions of civil government in the Philippine Islands, and allows the Philippine Government in the Philippines the widest latitude. It gives them legislative, judicial, and executive powers. They collect and disburse all revenues accruing in the Philippine Islands. This act authorizes the Secretary of War to disapprove any act of the Philippine Commission—a power in the thousands of acts passed by the Commission which has not yet in a single case been exercised.

The collection of information for the President, the Secretary of War, and Congress, which has resulted in United States laws relating to the Philippines, has put a vast amount of work on the Bureau of Insular Affairs.

On May 1, 1900, civil government was given to Porto Rico, and the War Department lost jurisdiction over the same. This law provided that once a year the civil governor was to report to the President. Today she is an orphan in her daily relations with this country. Full information about her and her affairs, outside of these annual reports of the civil governor, can only be gained by writing to the governor.

Cuba, on May 20, 1902, became a foreign government. The work by the intervening military government that made that possible is of vivid recollection in the Bureau. The information that was necessary for Congress to possess in order to enact the necessary legislation relative to the turning over of that government was furnished by the Bureau, and it believes it played quite a part in the treaties which have just been ratified by the Cuban Government.

The records of the United States military government of Cuba have been brought to Washington and are now thoroughly arranged in a separate building, as an annex of this Bureau, under a force of clerks, for constant reference and the furnishing of information to both Cuba and the United States. I will therefore thus hastily pass over the work done in connection with Porto Rico and Cuba and direct your attention to what has been and is being done in the far-away Philippines, where the civil government has so developed as to more than make up for the time and labor gained when we were relieved of the charge of Porto Rican and Cuban affairs.

First, however, let me speak of the important branch of the Bureau under the direction of its law officer, Charles E. Magoon.

It will incidentally show the scope of the work of the Insular Bureau, for law questions were not examined excepting when raised in actual cases pending in the War Department, and after those questions had been investigated and the course to be pursued ascertained it devolved upon the Bureau to do the work. The questions thus presented to the War Department developed a broad field for investigation, including the law

of military occupation, the laws and usages of civilized warfare, international law, interpretation of the Constitution of the United States, interpretation of treaties respecting the territories subject to military occupation, the status of the territories and inhabitants acquired during the war with Spain, the laws of Spain rendered ineffective or remaining in force in said islands, the effect of the transfer upon the obligations of the previous sovereignty, the rights of individuals and communities affected by the action of the military government, the administration of military government by civilian officials, and the law respecting claims against the United States based on military operations, encampment of troops, conduct of soldiers in territory affected by the war.

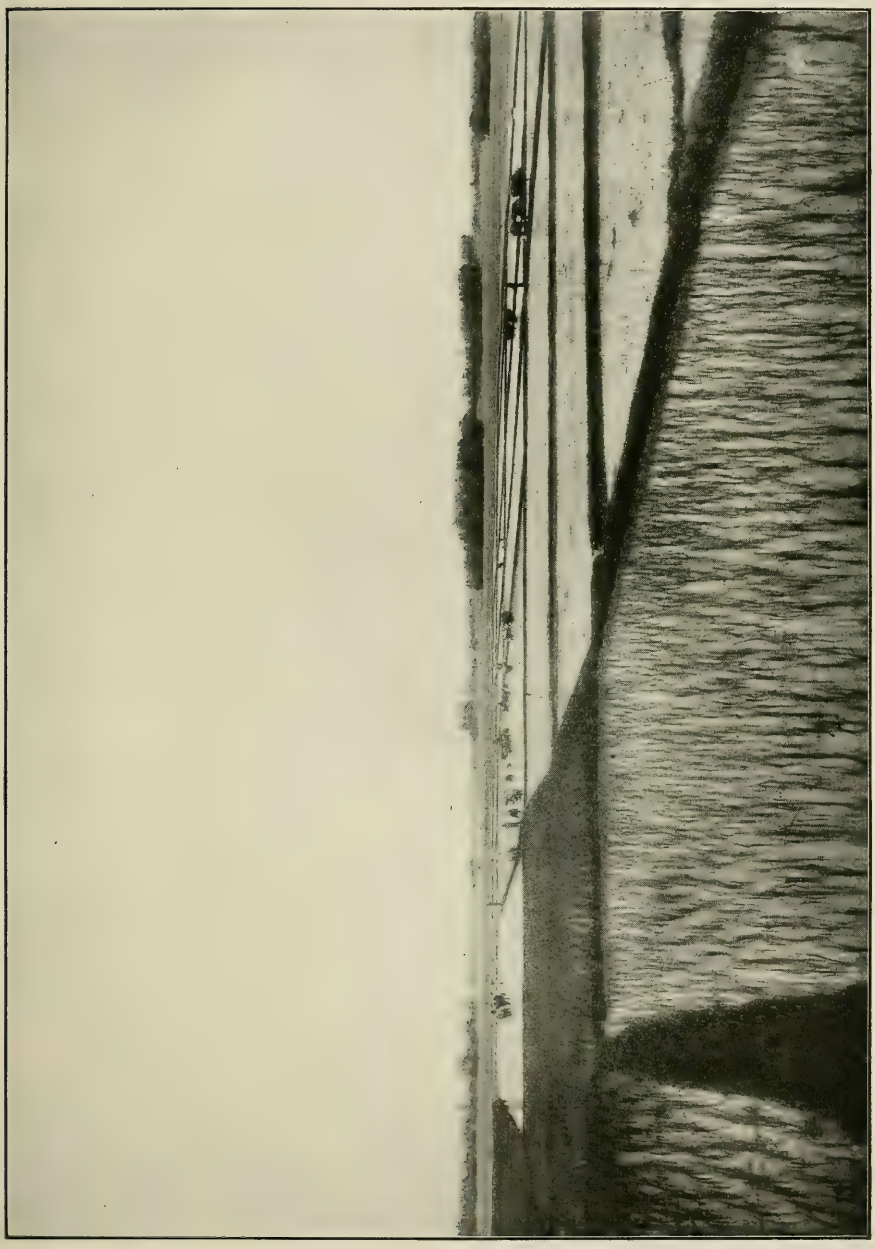
Some of the many questions thus generally summarized could not be disposed of by adherence to rules already established by judicial decisions, for questions arose which had not been judicially determined. It was therefore necessary to extend the investigation into the field of history, and see if the same or similar questions had arisen in the several instances of previous acquisition of foreign territory by the United States, and to learn how the question had been dealt with by the legislative and administrative branches of the government of the United States. To ascertain the treatment accorded by the legislative branch of our government to the territory and inhabitants of the Northwest Territory, Louisiana, East and West Florida, Texas, New Mexico, and Upper California, Oregon and Alaska, Samoa, the Guano Islands, and the Hawaiian Islands required a review of congressional debate and legislation extending over more than one hundred years, while the treatment afforded by the administrative branch required a review of the reports of the several departments of that branch, embodied in many annual and special reports to Congress and now buried in that *terra incognita* known as congressional documents.

The reports on the subjects above outlined have been compiled and published in book form, making a volume of over eight hundred pages. The work has received universal commendation from the press and public without regard to party affiliations or personal views on the course pursued by the War Department in matters pertaining to insular affairs. The *Review of Reviews* said of the work:

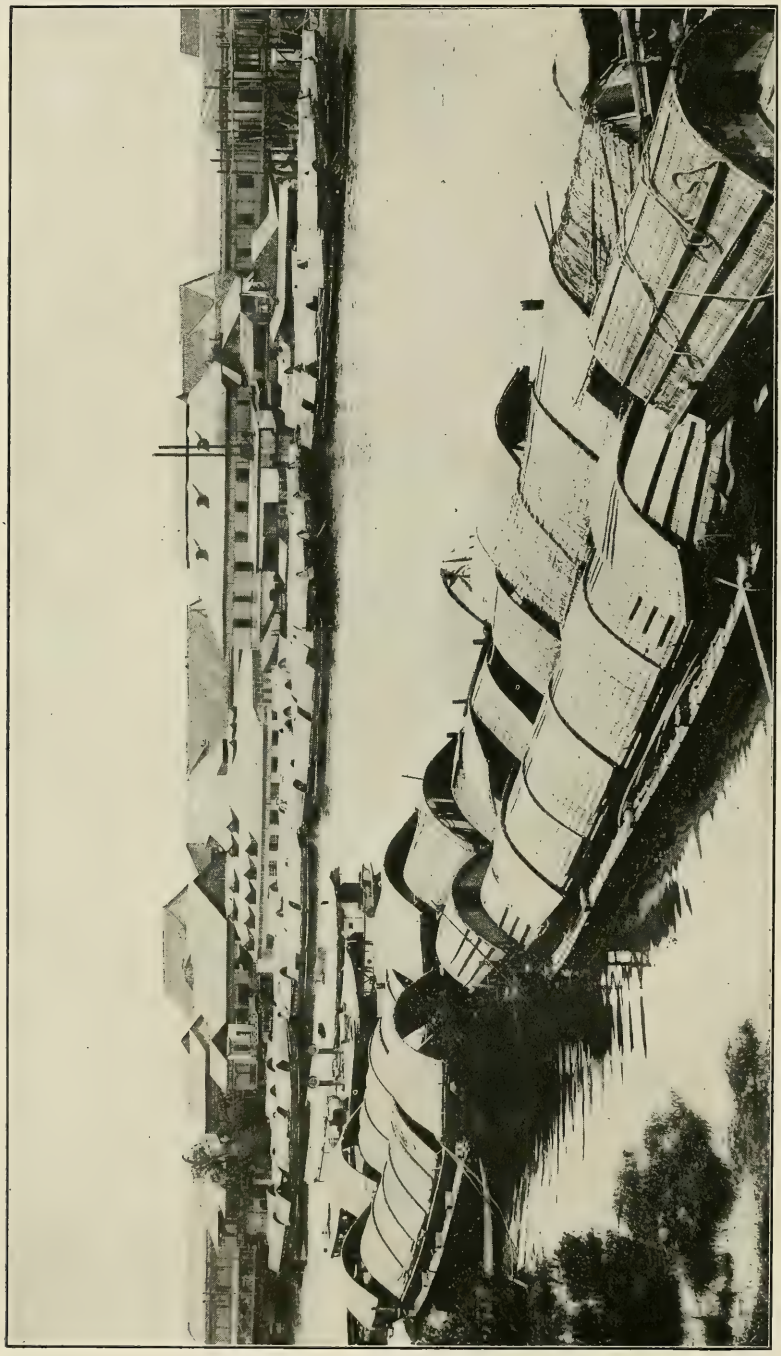
"Nothing could illustrate better than this volume the vast number of intricate questions that have arisen in the course of our conduct of affairs in the islands formerly belonging to Spain, nor could anything throw more light upon the care with which the War Department has studied all the principles and precedents of constitutional and international law in its treatment of every issue that has arisen."

The work of the law officer during the past year evidences that the government of the Philippine Islands has entered the second stage of its development. Prior to this year the principal questions pressing for consideration arose from the relations sustained by the territory and inhabitants of the Philippine Islands to the federal government of the United States under the laws of war and of nations, the treaty of peace and cession, the principles on which our government is founded, and the theories of governmental administration prevailing in the United States. During the current year the questions presented have been largely questions involving the relations sustained by the existing civil government of the islands to the preceding military government and to the federal government as created or regulated by congressional enactments.

The transfer of the powers of civil government from the military authorities to civilian officials, and the substitution of a government under a code



RICE PADDIES.



INHABITED CASCOS LYING IN THE PASIG RIVER.

Fifteen thousand people of Manila live on these boat rafts.

civil, based upon an act of Congress, in the place of a government under the code military, deriving its authority from the laws of war, made it necessary to formulate regulations and procedure for the enforcement of numerous provisions of congressional enactments affecting the Philippine Islands—such, for instance, as the provision of the act approved March 8, 1902, that "all articles the growth and product of the Philippine Islands admitted into the ports of the United States free of duty under the provisions of this act, and coming directly from said islands to the United States for use and consumption therein, shall be hereafter exempt from any export duties imposed in the Philippine Islands;" or the provisions of section 8 of the act approved March 2, 1903, authorizing the treasurer of the Philippine Islands to accept deposits of Philippine pesos and issue silver certificates therefor.

In some instances questions have arisen as to the effect on the interests of the federal government of certain legislation enacted by the legislative branch of the government of the Philippine Islands—such, for instance, as, What articles intended for the use of the personnel of the army are to be admitted free of duty? or, What expenditures of the military authorities are subject to review by the auditor of the islands?

The establishment of a judicial system in the Philippines affords a means for the adjudication of litigated questions between the inhabitants and of many questions respecting the jurisdiction and authority of the officials of that government. Whenever possible, controversies are referred to those tribunals. In some instances questions have arisen affecting the action or authority of officers of the executive department of that government in matters controlled by the discretion of the administrative branch and affecting the administration of civil affairs. These questions are considered and determined by the War Department, upon investigation and report by the law officer.

In general, the numerous questions inevitable from the change in government have been anticipated and provided for in advance of an actual instance arising, and it is a gratifying fact that few controversies and no serious disagreements have arisen, while such differences of opinion as developed were readily adjusted. The officials of the military and civil establishments in the Philippine Islands have at all times exhibited an earnest desire for effectual coöperation and coördination, and that purpose has been promoted by the fact that the Bureau of Insular Affairs, when called upon to investigate controverted questions, has been able to appreciate the point of view of both the civil and military authorities.

PHILIPPINE ACCOUNTING-AUDITING SYSTEM

There has been a double aspect to the auditing of the accounts of the insular government under the War Department. One is the responsibility of the officers who handle insular funds to the government of the Philippine Islands, and the other is the responsibility of this government to the government at Washington, whose duty it is to see that all the checks and safeguards which Congress has placed about the public moneys of the United States have also been applied to the revenues of the islands. One branch of this Bureau is organized and devoted to this work. The rules and instructions governing the auditing system of the Philippines, which practically put into force the accounting and auditing system of the United States, adapted by experience to local conditions, with added checks and safeguards, were made here. Under a law of the Philippine Commission which has been ratified and indorsed by act of Congress of July 1, 1902, before mentioned, state-

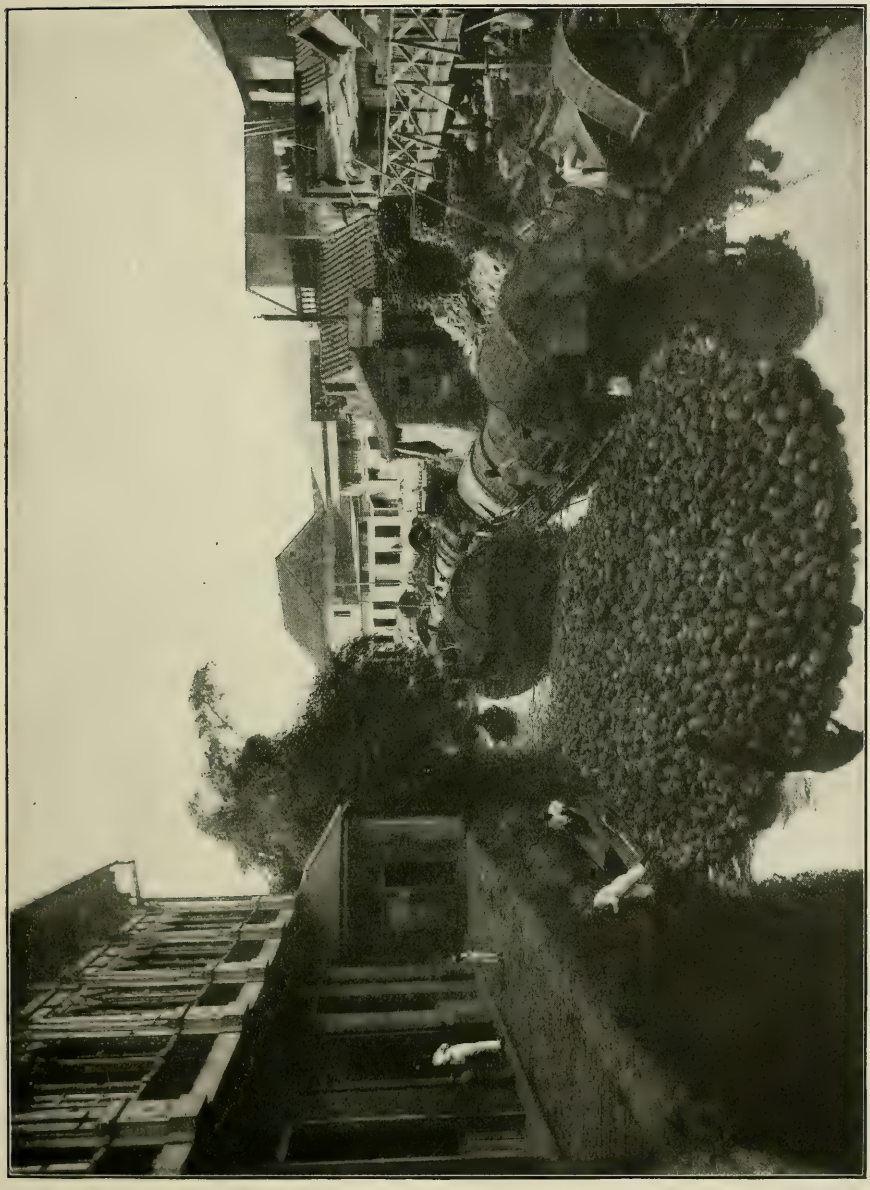
ments of all receipts and expenses are directly reported to this Bureau—that is, statements of accounts are all entered in ledgers under a carefully thought-out accounting system and a carefully tabulated statement of all receipts and expenditures made to Congress. It is difficult to make clear to one not acquainted with the facts the amount of work this involves. These accounts for the Philippines up to June 30, 1902, cover 12,600 closely typewritten pages. These sheets, after being sent to Congress, have been printed as documents, and are there open to anybody interested in our stewardship of the island possessions.

The duties of the auditor cease, so far as this Bureau is concerned, when each individual account settled by him in the Philippines has been certified. The work performed here is considered a comptroller's review of the fiscal affairs of the islands, and discrepancies or errors arising from whatever cause in the accounts of an officer can be immediately discovered and adjusted. This Bureau is therefore enabled at all times to furnish correct and detailed information relative to the receipts and expenditures or to any disbursing officer's accounts in the islands.

PHILIPPINE TARIFF

Upon the occupation of Manila the old Spanish tariff was made effective until such time as more pressing affairs would permit of a revision. In June, 1900, a board of officers was appointed at Manila to revise the tariff, and said board invited suggestions from the merchants of that city, and informed themselves as to what should be done in the matter of revision. In August of the same year the board was instructed to turn its work over to the new Philippine Commission, and it, after investigation, forwarded a draft of the tariff to Washington. It was received February 9, 1901, and printed immediately as a "proposed" tariff, and sent to the more important journals and trade papers in the country, as well as to manufacturers, exporters, and others, asking that they make any suggestions desired, and their expression was invited in order to make a tariff that would be both fair to the revenues of the islands and equitable to the exporter and consumer. After all suggestions had been received the entire tariff was carefully studied, paragraph by paragraph, every suggestion was considered, a number of guarded changes were made, and the appraiser of the New York custom-house was asked to go over it for any possible changes in the classification or descriptive language that might make its application as free as possible from ambiguity. It was then printed, translated into the Spanish language, and forwarded to Manila. No tariff could have been given more careful legislative consideration at both ends of the line. When Congress assembled the tariff was presented to that body for ratification. As a unique feature in tariff legislation, it may be said that the Philippine tariff passed both Houses of Congress, after four months' discussion, without a single paragraph or rate of duty prescribed by it criticised by any member of either party in either house. The tariff has been a success; the revenues have increased under its operation, in spite of fearfully adverse conditions that ought to have decreased the revenues.

Cholera has raged throughout the islands. How many victims it has claimed can not be told until the census has been completed; but by comparison with the former visitation of cholera, I should not be surprised to find that it claimed from five hundred thousand to eight hundred thousand victims. Rinderpest has killed over 95 per cent of the carabaos, the native work cattle—enough to paralyze agriculture. Surra, a form of glanders, has been found as fatal to the horses, and a drought has been



A COCOANUT RAFT FROM LAGUNA IN ONE OF THE ESTEROS OF MANILA.

MOROS CARRYING A WOOD SAMPLE—TWO MOROS GOING AHEAD TO CUT A PATH THROUGH THE JUNGLE.

Two small vines of green rattan will hold the heaviest sample.

The Bureau of Forestry of the Insular Government is making a systematic survey of the diverse woods of the Philippine Islands.

experienced in the past two years worse than anything that has been known in sixty years; but probably the Philippines has experienced its worst luck in the two years' visitation of locusts, which have destroyed everything in their path. Yet, in spite of this, as I say, the revenues have increased, and last year, for the first time since American occupation, a balance of trade in favor of the islands to the extent of $150,000 is shown. The following table shows the increase of the total imports and exports each year:

1899	$25,479,922
1900	40,352,504
1901	53,494,354
1902	56,069,521
1903	66,093,662

I am officially informed that no serious inequalities have been found in the tariff.

To be concluded in July number

SOME INDICATIONS OF LAND IN THE VICINITY OF THE NORTH POLE*

By R. A. Harris,

U. S. Coast and Geodetic Survey

IT is a well established fact that there are two important surface currents (or drifts) in the Arctic Ocean. One of these flows easterly along the northern coast of Alaska, through the Arctic Archipelago, finally reaching the Atlantic Ocean through Davis and Hudson Straits. The other starts in the neighborhood of Herald Island, northwesterly from Bering Strait, and thence flows northwesterly, passing to the north of New Siberia; thence to the north of Franz Josef Land and the Spitzbergen Islands, and through Denmark Strait to and around Cape Farewell. Therefore these currents are near together when north of Bering Strait and again when in the vicinity of southern Greenland.

Some evidence of the American current may be cited. The ships *Advance* and *Rescue*, of the first Grinnell Expedition, were for a while carried northerly in Wellington Channel by the drifting ice; but when near the northern end of the channel the current reversed, and thereafter they were carried southerly and easterly through Barrow Strait, Lancaster Sound, Baffin Bay, Davis Strait to latitude 65° 30′ N., where they got themselves free from the ice. The amount of southeasterly drifting measures about 1,000 nautical miles, and required a little more than six months, extending from November, 1850, to June, 1851. This gives an average rate of 5 miles per day.

In May, 1854, the British ships *Intrepid* and *Resolute* were abandoned off the western end of Barrow Strait. The *Resolute* was picked up off Cape Mercy, in the south end of Davis Strait, in September, 1855. During these 16 months 1,100 miles were covered, making an average rate of 2⅓ miles per day.

Strong easterly currents are encoun-

*Read before the Philosophical Society of Washington, April 9, 1904. Communicated to the National Geographic Magazine by O. H. Tittmann, Superintendent of the U. S. Coast and Geodetic Survey.

Map of Arctic Regions, Showing Outline of Indicated North Polar Land

tered in Fury and Hecla Straits and in Bellot Strait.

Northeasterly currents off the northwestern coast of Alaska have been noted by Captain Collinson,* and easterly currents along the northern coast by Captain McClure.† Collinson noted an eastern set in Dease Strait far to the east,‡ and McClure found a large quantity of American pine, almost certainly from the Mackenzie River, drifted into Prince of Wales Strait.§

McClure Strait is constantly filled with ice, probably coming in chiefly from the west.

The existence of the current far to the north of Russia is pretty well established by the drifting of the steamship *Jeanette* from Herald Island to a point northeast of New Siberia where she was crushed in the ice, and by the subsequent drifting of some papers and clothing from the sunken vessel across the polar sea to Julianehaab, near Cape Farewell. The *Jeanette* was frozen in the ice September 6, 1879, and was crushed June 12, 1881, having made good a distance of 600 miles. During the last five of these 21 months much more than half of all the distance made good was covered, and during the last 26 days almost one-sixth. The relics were picked up in 1884, or three years after the sinking of the boat, having gone a distance of at least 2,900 miles.

Before undertaking his famous voyage in the *Fram*, Nansen adduced, as further evidence of this current, the finding on the coast of Greenland of an implement which almost certainly came from the Alaskan Eskimos in the vicinity of Bering Strait; also the prevalence of driftwood on the Greenland coasts and the north coast of the Spitzbergen Islands, the species indicating that a large portion of this wood came from northern Siberia.

The voyage of the *Fram* verified his previous calculations in a remarkable manner. That vessel became fast in the ice at a point northwesterly from New Siberia, September 22, 1893. It thence drifted to a point north of the Spitzbergen Islands, having passed about midway between Franz Josef Land and the North Pole. It was released from the ice June 14, 1896, thus having drifted for 33 months, the distance made good being 900 miles. At the beginning of the drifting the rate of the current was a little more than half a mile per day, and increased to one mile near the end.

Having established the existence of these two prevailing surface currents, and noting that both eventually flow to southern Greenland, the question arises as to why the *Jeanette* did not drift almost due north, instead of bearing off to the west. The *Fram* went almost directly toward the eastern coast of Greenland. It is true that after the loss of the *Jeanette*, Commander De Long and his party found themselves on ice drifting rapidly northward. As already noted, the last 26 days' drifting of the boat covered about one-sixth of the entire distance. These facts suggest a broad strait north of Bennett Island, beyond which is the corner of a large tract of land dividing the deep Arctic channel traversed by the *Fram* from the shallow sea through which the *Jeanette* drifted. The final accelerated rate and northward direction of De Long's drift seem to indicate proximity to this strait.

This sea extends from Bennett Island to Banks Land. It is about 30 or 40 fathoms deep along the track of the *Jeanette*, and perhaps from 100 to 200 fathoms west of Banks Land, where it is known as Beaufort Sea.

That land probably extends to the north of Beaufort Sea can be inferred from the fact that the ice found here is

* Collinson: Journal of H. M. S. *Enterprise*, edited by his brother, pp. 137–142.

† McClure: The Discovery of the Northwest Passage, edited by Osborn, p. 71.

‡ Collinson: L. c., p. 291.

§ Richardson: The Polar Regions, p. 232.

very old, the sea seeming to have no broad outlet through which the ice can escape, as it does north of Siberia. The openings to the east are long and rather narrow channels. This does not argue against a tolerably broad expanse of water extending westward; for, the currents setting eastward prevent the ice from escaping to the west. It seems probable that land, continuous or nearly so, must extend far westward from off Banks Land; for, this supposed land and the eastward currents might well explain why it is that the ice never recedes far northward from the northern coast of Alaska nor westward from Banks Land.

Osborn thus speaks of the ice encountered by McClure in Beaufort Sea: "Ice of stupendous thickness and in extensive floes, some seven or eight miles in extent, was seen on either hand; the surface of it not flat, such as we see in Baffins Strait and the adjacent seas, but rugged with the accumulated snow, frost, and thaws of centuries." *

Such are the arguments for the existence of a tract of land extending from near the northwest corner of Banks Land, or from Prince Patrick Island, to a point north of New Siberia, based upon the drifting of the ice on the one hand and upon its age and comparatively slight movement on the other hand.

Let us next consider what are the indications from the tides. In the first place, the tide at Point Barrow is semidiurnal in character, with a mean range of 0.4 foot, the flood coming from the west. This can not come through Bering Strait, because the tide immediately south of the strait has scarcely 1-foot range, with a large diurnal inequality, and at a short distance north of the strait, at Pitlekaj, where the *Vega* wintered in 1878–'79, the range of the semidiurnal tide was carefully measured and found to be only 0.2 foot. Whence comes the Point Barrow tide? It can not come from the north or east, because all observers agree that the flood comes from the west, and that it is high water on the western side of the point considerably earlier than on the eastern.* De Long's party made careful observations upon the tide at Bennett Island, and these show a range of 2 feet. Such a range, diminished by the broadening of the shallow sea to the east of this island, might well be reduced to that found at Point Barrow, provided one considers that the range generally diminishes off headlands and capes. On the other hand, if no land exists north of Point Barrow, how can the tide there be much less than that found at Bennett Island, and how can the flood come from the west? For, practically all of the Arctic Ocean tide is derived from the Atlantic, chiefly through the Greenland Sea, and without land near the Pole one of these stations would be reached about as well as the other.

The reasons for not drawing the boundary straight from the Bennett Island corner to the Banks Land corner, but deflecting it to the south, are, first, the apparent necessity for such a bend in order that the direction of the flood may better accord with observation, and that the times of the tides of northern Alaska may be consistent with those at Bennett Island, and, second, the small north-and-south movement of the ice north of Alaska indicating that the sea is here probably narrower than it is farther west, or north of Siberia.

In the extreme north this land can not extend much beyond the Pole toward Franz Josef Land, because this would undoubtedly have there caused a bend in the track of the *Fram's* drift.

* McClure: L. c., p. 83.

* Thomas Simpson: Discoveries on the North Coast of America, 1836-1839, pp. 161, 162, 167.

Accounts and Papers, Navy, vol. 42 (1854), p. 162.

Lieut. P. H. Ray: Report of the International Polar Expedition to Point Barrow, Alaska, p. 678.

Furthermore, the undiminished range of tide at Bennett Island perhaps indicates that the Nansen channel does not greatly broaden at the Pole.

Between this supposed land and the islands recently discovered by Sverdrup may be other islands, forming a continuation of the Arctic Archipelago and separated from one another by channels of moderate depths, or perhaps this land approaches the Garfield Coast and Grant Land. At any rate, the range of tide diminishes from 2 feet at Cape Sheridan to 1½ feet at Northumberland Sound, Penny Strait; and Lockwood and Brainard judged the tide to be small at Greely Fiord. These indicate that the access of the tide from the north is not altogether unrestricted; in fact, part of the tide at Northumberland Sound comes from the east through Belcher Channel.

We come now to another question. A few tides have been observed along the northern coast of Alaska by the explorer, Thomas Simpson.* They show that the tide on the outer coast occurs nearly simultaneously from Point Barrow to Camden Bay and Simpson Cove. But as the international boundary line is approached a great change takes place: the tide at Demarcation Point, not 100 miles farther east, is about seven hours later in its time of occurrence. Observations are not sufficient for showing how this change takes place, but it certainly occurs. The set of the flood along the outer coast is given as easterly for all points where it has been observed from Point Barrow to and beyond Cape Bathurst; but such observations are very meager, probably on account of the smallness of the tide. This would seem to preclude the possibility of the principal part of the tide coming from the north or east; hence the probable approach of the polar land to Banks Land, or to Prince Patrick Island, or to Grant Land.

* Simpson: Discoveries on the North Coast of America, 1836–'39, pp. 115, 117, 121–123, 132, 138, 161–162, 167, 178, 183.

Suppose an island about 100 miles in diameter to be separated from the coast by a shallow strait about 75 miles wide in its narrowest part. By assuming that deeper water exists to the west of the strait and island, and that the tide comes from the west, it seems possible to account for the sudden change in the time of tide; for, the main wave, going north of the island, would control the time of the tide to east of it and in Mackenzie Bay, and deep water west of the island and shallow strait would cause the tide at Camden Bay and westward to occur remarkably early, just as if this coast were at the head of a deep, suddenly-terminated canal extending northwesterly.

Immediately eastward from this supposed strait both Simpson* and McClure† found that the waves became more like those upon a sea of some magnitude, and the latter, sailing a little north of east, found the depths to rapidly increase from 9 to 32 fathoms, and soon to 195 with no bottom.

Now, the question is, Why this more sea-like appearance, unless some huge obstruction lies immediately to the west? It may, of course, be partly due to the open water caused by the influx of the Mackenzie.

It will be of interest to note that several Arctic authorities have at various times suspected or inferred the existence of land near the Pole.

Richardson says: "The Eskimos of Point Barrow have a tradition, reported by Mr Simpson, surgeon of the *Plover* [in 1832], of some of their tribe having been carried to the north on ice broken up in a southerly gale, and arriving, after many nights, at a hilly country inhabited by people like themselves, speaking the Eskimo language, by whom they were well received. After a long stay, one spring in which the ice remained without movement they returned without mishap to their own

* Simpson: L. c., p. 176.
† McClure: L. c., p. 82.

country and reported their adventures. Other Eskimos have since then been carried away on the ice, and are supposed to have reached the northern land, from whence they have not as yet returned. An obscure indication of land to the north was actually perceived from the masthead of the *Plover* when off Point Barrow." *

On August 15, 1850, Captain McClure, anchored off Yarborough Inlet, about half way from Point Barrow to Demarcation Point, writes:

"The packed ice today, as far as the eye can reach, appears solid and heavy, without a drop of water discernible. The refraction has been considerable, giving to the edge of the pack the appearance of a continuous line of chalk cliffs, from 40 to 50 feet in height. From the light shady tint, which in different parts of the pack is distinctly visible, I should be inclined to think that there may be many of the same kind of islands as those we have met with, extending to the northward, and impeding the progress of the ice, thereby keeping this sea eternally frozen." †

Captain Collinson, who wintered at Simpson Cove, 1853–1854, actually undertook a sledge journey in the spring northward, one object of which was to see if land would not be reached. The roughness of the ice caused him soon to abandon the project. He writes:

"I therefore returned, and with sorrow gave up an attempt which . . . I had looked forward to with much interest; thinking that, with anything like a favorable road, I should reach 73° N. latitude, and settle the question with regard to the open sea, which certainly does not appear to exist here in the same manner as it does to the north of the Asiatic continent." ‡

In 1873 Admiral Sherard Osborn read a paper before the Royal Geographic Society in which he predicted the existence of an archipelago or land extending from near Prince Patrick Island up very near to the Pole and thence to Wrangell Island, thus forming the northern boundary of a nearly inclosed sea. *

A probably less happy prediction was made by Petermann, who contemplated land extending northeasterly from Greenland, thence across the Pole to Wrangell Island.

Sir Clements Markham is quoted as having said in November, 1896:

"Personally, as I do not believe in any land near the Pole, or on this side of it beyond Franz Josef Land, I trust an attempt will be made to explore another portion of the Arctic regions. I believe there is land, probably in the form of large islands, between Prince Patrick Land and the New Siberia Islands." †

Prentiss discredits there being much land north of Bering Strait, but his reasons for so doing can hardly be regarded as convincing.

ADDENDUM

Since reading the above paper, I accidentally came across a paper by Marcus Baker, in Volume 5 of the NATIONAL GEOGRAPHIC MAGAZINE, entitled "An Undiscovered Island off the Northern Coast of Alaska." He suggests that the supposed land be called Keenan Island. The following statements are there furnished by Captain Edward P. Herendeen, who for many years was engaged in whaling:

"It is often told that natives wintering between Harrison and Camden Bays have seen land to the north in the bright, clear days of spring.

"In the winter of 1886–'87, Uzharlu, an enterprising Eskimo of Ootkeavie,

* The Polar Regions, p. 240.
† McClure: L. c., p. 81.
‡ Collinson: L. c., p. 312.

* Clements R. Markham: The Threshold of the Unknown, pp. 216–224.
† Prentiss: The Great Polar Current, p. 105; see also p. 19.

was very anxious for me to get some captain to take him the following summer, with his family, canoe, and outfit, to the northeast as far as the ship went, and then he would try to find this mysterious land of which he had heard so much; but no one cared to bother with this venturesome Eskimo explorer. So confident was this man of the truth of these reports that he was eager to sail away into the unknown, like another Columbus, in search of an Eskimo paradise."

"The only report of land having been seen by civilized man in this vicinity was made by Captain John Keenan, of Troy, New York, in the seventies. He was at that time in command of the whaling bark *Stamboul*, of New Bedford. Captain Keenan said that after taking several whales the weather became thick, and he stood to the north under easy sail, and was busily engaged in trying out and stowing down the oil taken. When the fog cleared off, land was distinctly seen to the north by him and all the men of his crew; but, as he was not on a voyage of discovery and there were no whales in sight, he was obliged to give the order to keep away to the south in search of them. The success of his voyage depended on keeping among whales.

"The fact was often discussed among the whalemen on the return of the fleet to San Francisco in the fall. The position of Captain Keenan's ship at the time land was seen has passed from my mind, except that it was between Harrison and Camden Bays."

It will be noticed that these statements would place the island a little to west of the position shown on the accompanying map.

NOTES ON MANCHURIA

By U. S. Consul Henry B. Miller, Niuchwang, Manchuria

I BELIEVE there is no place in the world where the wagon or cart traffic is equal to that of Niuchwang. The carts compete with the railroads in a haul of 400 miles or more. During the winter months, when the roads are firmly frozen, there are not less than 2,000 carts, each carrying two tons, per day coming to the port, each drawn by from four to seven mules or ponies. Some of these carts are from thirty to forty days on the roads, in order to reach the market. It is under such conditions as these that the trade of Niuchwang, amounting to nearly $20,000,000 per year, has grown. It is a mistake to attribute the growth of this trade to the building of the Russian railway. The railways are just beginning to have an influence toward improving the trade of the country, and the natives are only beginning to alter their methods to meet these new conditions. It is plain that the railways will add much to the development of the productiveness and trade of the country, but that remains for the future to show. The country has made this marvelous growth independent of the railways, and what it will do with them will depend upon the wisdom of the railway management.

Before 1902 practically all the foreign trade in Manchuria came through the port of Niuchwang, and the Chinese annual customs returns gave the complete statement of imports and exports for all the country. This was altered to a considerable extent by imports and exports in 1902 through Dalny, Port Arthur,

and Vladivostok. In 1903 the situation changed still further, and foreign imports now enter through Niuchwang, Dalny, and Port Arthur via Tientsin, Chin Wang Tao, and thence by rail over the Chinese railway recently completed to the River Liao at Shin Min Tun; also by the Russian railway from Vladivostok and Siberia and Russia. Another important route has been opened into Manchuria from the sea up the Amur River and thence up the Sungari River by large river steamers to Kirin.

There are no records telling the origin of the goods imported. American goods reach here in many ways. Some come from Hongkong and Canton, large quantities from Shanghai, and some from Japan, while much American cotton is manufactured into yarn and goods in Japan and then shipped to this place.

NATURAL WEALTH OF MANCHURIA

The year 1903 was the best that Manchuria has ever known as to its production. Crops were unusually good, and prices were also good. Both Manchuria and Mongolia are marvelously rich, and, under a good government, with transportation provided and its timber and mineral wealth developed and added to its agricultural resources, Manchuria will prove one of the greatest markets for United States goods, as well as a splendid field for the investment of United States capital. In 1894 and 1895 it was the field of war between China and Japan; in 1900 it was the district of the Boxer movements that were so destructive, and now again, in 1904, it is the theater of war between Russia and Japan.

Notwithstanding all these wars, the country continues to grow in productiveness and commerce. Its people are largely industrious, frugal, and capable, and need only an enterprising, substantial, and honest government to insure them great prosperity.

Manchuria is not yet thickly populated, and farms are mostly in large tracts of 100 and 200 acres, and even more. The great commercial development has come as a result of its agricultural development and the settlement of the country by agricultural people from other parts of China.

Although the country is extremely rich in minerals, including coal, iron, copper, silver, gold, and other kinds, these have only been worked in a small and crude way by the natives. When the mineral wealth is developed and worked by modern methods in a manner fitting its economic possibilities, Manchuria will prove to be one of the richest sections of Asia.

It has the happy combination of a splendid variety and vast quantities of minerals, valuable forests, great agricultural wealth, and an industrious, capable people, whose labor is, perhaps, the best in the world for its cost. In addition, it has good waterways and easy grades and a country in which railway construction and operation is very economical. All of these advantages are combined with a healthy, invigorating climate, where crops never fail.

THE RED ANT VERSUS THE BOLL WEEVIL

A MIGHTY interesting and efficient little insect, a red ant, worth perhaps a quarter of a billion dollars annually to our country, has been discovered among the Indian cotton fields of Guatemala by O. F. Cook, of the Department of Agriculture. It is believed when introduced into our Southern States the ant will save us millions, perhaps hundreds of millions,

of dollars each year, by checking the boll weevil pest, whose ravages have become so terrible of late. During the past three years the boll weevil has cut in half the value of the cotton harvest of ten counties of Texas which it has invaded. All efforts to check the weevil have been in vain. It has spread with the rage of an epidemic, until the Southern States are dreading that they will see one-half or all of their cotton crop, whose normal value is $500,000,000, swept away. The boll weevil is a kind of beetle, living on the bolls of the cotton tree. A single pair of boll weevils will multiply in a single season into millions of ravenous and destructive insects.

Some time ago the investigators of the Department of Agriculture learned of a variety of cotton grown by the Indians in Guatemala which seemed not to be subject to the attacks of the boll weevil.

The Secretary of Agriculture accordingly dispatched Mr O. F. Cook to Guatemala to ascertain whether it possessed in reality any quality enabling it to resist the boll weevil or to learn other causes of its immunity from the attacks of the insect.

A thorough search by Mr Cook shows that the weevil is present and able to injure the cotton, but reveals also an active enemy which keeps it in check. This is a large reddish-brown ant, which is attracted to the cotton by the food which it secures from three sets of extra floral nectaries.

The ant attacks the weevil on sight and finds it an easy prey. The ant's mandibles are large enough to grasp the weevil around the middle and pry apart the joint between the thorax and the abdomen. The long flexible body is bent at the same time in a circle, to insert the sting at the unprotected point where the beetle's strong amoris open.

The poison takes effect instantly, the beetle ceases to struggle, and, with its legs twitching feebly, is carried away in the jaws of its captor. As with many other insects when stung by wasps, the paralysis is permanent. Even when taken away from the ants, the beetles do not recover.

The adroit and businesslike manner in which the beetle is disposed of seems to prove beyond question that the ant is by structure and by instinct especially equipped for the work of destruction, and is, in short, the true explanation of the fact that cotton is successfully cultivated by the Indians of Alta Vera Paz in spite of the presence of the boll weevil.

Instead of congregating in large numbers on the cotton in the immediate vicinity of their nests, the ants have, as it were, the good sense to spread themselves through the field, from two to four and five usually being found doing inspection duty on each plant. In some places there seemed to be not enough ants to go around, and here the beetles were more numerous. Rarely, too, certain flowers or branches seemed to have been overlooked, beetles being found on the same plants with the ants. In such instances, indeed, the young flower or boll was generally riddled with punctures, as though many beetles had availed themselves of a rare opportunity of feeding undisturbed.

Cotton-growing among the Indians is something of a special art, the community being supplied by a few men, aware, as it were, of the secrets of the business. They know nothing about the weevil and its ravages, and ascribe such damage as occurs to other harmless insects or even to superstitious causes, such as the failure of the owner to abstain from salt at the time of planting. The ant, however, is definitely associated in their minds with cotton, and they do not expect to secure a good crop unless these insects favor the plants with their presence. Some of the Indians give the ant a special name, "kelep," not applied to any other

species, but it is also referred to as "the animal of the cotton."

The perennial tree cotton furnishes permanent breeding places, so that the conditions are most favorable to the propagation of the beetles in large numbers. The ants, however, are evidently able to hold them in check, and thus permit the regular cultivation of the annual variety of cotton by the Indians.

If the cotton ant can survive a long dry season and perhaps cold weather in the table-lands of Guatemala, it might easily learn to hibernate in Texas, as has the boll weevil. The ant, indeed, is much better able to protect itself against frost, since it excavates a nest three feet or more in the ground. That it is a reasonably hardy insect is shown also by the fact that several individuals have survived confinement for twelve days without food and seem now to be thriving on a diet of cane juice. To take worker ants to Texas will be evidently a very easy matter, but to obtain queens and to establish permanent colonies may require considerable time and experiment and a thorough study of all the habits of the species.

Although the cotton seems to be especially adapted to attract the ant by means of its numerous nectaries, the insect is not, like some of the members of its class, confined to a single plant or to a single kind of prey. It was observed running about on plants of many different families, and it attacks and destroys insects of every order, including the hemiptera, and even centipedes. On the other hand, it does not do the least injury to the cotton or to any other plant, so far as has been ascertained, and it can be handled with impunity, having none of the waspish ill temper of so many of the stinging and biting ants of the tropics.

Since where once established it exists in large numbers and seeks its prey actively, the ant is a much more efficient destroyer of noxious insects than the spider or the toad. It seems, in short, not unlikely to become a valued asset in the agriculture of tropical and subtropical countries, if not in temperate regions.

Efforts will immediately be directed toward introducing the ant to the cotton fields of Texas. Mr Cook has been supplied with all the funds and assistance he needs, and the Secretary of Agriculture will be much disappointed if good results are not realized.

GEOGRAPHIC NOTES

SIR HENRY M. STANLEY

1841–May 10, 1904

WHEN in 1870 the world became alarmed at not hearing from Livingstone for some time, Stanley, the soldier, newspaper correspondent, and Abyssinian explorer, was dispatched to find him by James Gordon Bennett, of the New York *Herald*.

Stanley cut across from Zanzibar and found Livingstone at Ujiji, on Lake Tanganyika. He had been surrounded by Arab slavers, his supplies destroyed, and his communication with the seacoast interrupted. After being relieved by Stanley, Livingstone returned to Lake Bangweolo, where he died in 1873.

In 1874 Stanley took up the work of Livingstone. He started from Zanzibar. After circling Victoria Nyanza, he explored Albert Nyanza and Tanganyika, and discovered Albert Edward Nyanza. He then descended the Lualaba Basin, which brought him to the Kongo, which he followed to the ocean.

Stanley was thus able to solve the last great African problem, namely, that

Tanganyika and the waters west of it belonged to the basin of the Kongo and and not to the Nile.

But of more practical value than the determination of the question of the headwaters of this river was the opening up to the commerce of the world of the densely populated countries along the banks of the Kongo and its tributaries. Stanley realized the rich commerce that could be developed among the millions of Africans. He forced Europe to his way of thinking, and more than any other individual precipitated the partition of Africa. He was chosen to be the first organizer and administrator of the Kongo regions, where in five years he introduced order and government. He lived to see railways and telegraph lines built and steamers whistling in the wilderness he opened, and an annual commerce amounting to $20,000,000 for the Kongo territory alone.

In 1887 Stanley started to cross Africa again, this time from west to east, to relieve Emin Pasha. After leaving the Kongo he forced his way through a vast, almost impenetrable, forest, and saw the pigmies discovered by Du Chaillu twenty-five years before, and the Mountains of the Moon.

MAP OF THE WORLD ON THE EQUIVALENT PROJECTION

LOOKING at the ordinary map of the world on Mercator's projection, one would imagine that Canada was twice the size of the United States, when as a matter of fact it is only slightly larger. Similarly Siberia and all lands distant from the equator are vastly exaggerated to the eye on Mercator's projection. Hence a large and convenient wall map of the world, that will give each country, whether on the equator or in the arctics, in true proportion is welcome, specially in these days when there is so much desire to compare the enormous recent territorial expansion of the powers. Such a map, giving the areas of all lands in true proportion, has just been published by C. S. Hammond Co., of New York. The map is 3 feet 8 inches by 5 feet and in 7 colors. The projection used was invented by Prof. C. B. Mollweide, in 1805. It is an equal-surface projection in which the entire surface of the earth is represented inclosed within an elliptic outline, whose major and minor axes represent the equator and central meridian respectively with a ratio of 2 to 1. The parallels are straight lines, and the meridians, ellipses, and each zone or subdivision of the projection is in due proportion to the corresponding area on the sphere. The distances of the parallels from the equator line are computed from the formula characteristic of the projection. The meridians are placed 15 degrees apart.

The map published by C. S. Hammond Co. has four insert maps, each 11 by 8 inches—Asia, Europe, United States, and the world on Mercator's projection. It contains an index of the principal countries, giving the area and population, and an index of the islands and of the principal cities. The Americas occupy the center of the map. The price of the map is $5.00, mounted on rollers and backed with cloth.

PEARY'S PLANS FOR HIS POLAR EXPEDITION

COMMANDER R. E. PEARY, U. S. N., is making arrangements to send an auxiliary ship to the Arctic this summer, going as far north as Etah and Cape Sabine (79 degrees north latitude). The ship will place a depot of coal and Commander Peary will make arrangements with the Whale Sound Eskimos to collect meat and various provisions for the use of his North Polar expedition during the year 1905. The auxiliary ship will go north about the first of July and return about the first of September. The itinerary of

the voyage will include ports of the Newfoundland, Labrador, Greenland, Ellesmere Land, and the Baffin's Bay coast. The unique feature of this preliminary trip will be the fact that Commander Peary has made arrangements to comfortably accommodate a number of passengers. The opportunity to bag walrus and polar bears will doubtless attract many sportsmen, while scientific men will be interested in this unusual opportunity to study ethnology and geology of the great white North. Commander Peary has entrusted the details of making up the party to the Committee on Applications, at 3 West Twenty-ninth street, New York city.

SOME RECENT ENGLISH STATEMENTS ABOUT THE ANTARCTIC

IN an article about the English Antarctic Expedition in the *Scottish Geographical Magazine* for May, 1904, at page 265, it is stated that "the *Discovery* succeeded in proving the non-existence of Wilkes Land." In an article by Sir Clements R. Markham, President of the Royal Geographic Society, "The Antarctic Expedition," in *The Geographical Journal* for May, 1904, at page 551, he states: "On March 2 the *Discovery* passed through the Balleny group. Continuing westward to the 156th meridian, near Adélie Land, it was found that the coast line shown on the chart east of that land is a mistake. No such land exists."

If Captain Scott, after passing through the Balleny Islands, *only sailed as far west as the 156th meridian*, he could at the most have disproved the existence of the extremest western points which Wilkes thought he sighted, namely, Ringgold Knoll and Eld Peak; but as nothing appears to be said so far of the latitude in which the *Discovery* sailed west, even this must remain an open question until further information; and the statement that "the *Discovery* succeeded in proving the non-existence of Wilkes Land," which extends for some fifty-five degrees of longitude west of 156° east longitude, is simply preposterous.

If Captain Scott did not sail west of 156° east longitude, he did not get within some sixteen degrees of longitude, over three hundred miles, of Adélie Land, and he did not approach Cape Hudson, Point Emmons, Point Case, Point Alden, Peacock Bay, and Disappointment Bay, and therefore Sir Clements R. Markham's statement "that the coast line shown on the chart east of that [Adélie] land is a mistake; no such land exists," is entirely unwarranted.

It seems well to call the attention of Americans to this matter, so that they may take cognizance of the fact that some British geographers, led by Sir Clements R. Markham, will perhaps make renewed efforts to smother and obliterate all remembrance of American discoveries in the Antarctic.

EDWIN SWIFT BALCH.

Philadelphia, May 21, 1904.

SEARCH FOR BARON TOLL

THE Imperial Academy of Sciences at St Petersburg has offered a reward for finding Baron Toll's expedition or any traces of it.

Baron Edward Toll, chief of the Polar expedition sent out by the Academy of Sciences, left the Bennett Island, lying north of New Siberia, on November 8, 1902, taking a southern direction. He was accompanied by the astronomer Seeberg and two Jakoots, Vassily Gorokhov, with the surname Chichak, and Nicolas Protodiakonow, with the surname Omook. The party seem to have been carried away by the ice, as the searches heretofore have been in vain. A reward of 5,000 roubles is offered by the Academy of Sciences for finding the whole party or any part of it, and a reward of 2,500 roubles for giving the first exact indications of tracing the party.

A REMARKABLE WATERSHED IN PENNSYLVANIA

ON the same farm in Potter county, Pennsylvania, are two strong, clear springs which bubble up out of the white sand with great force, and about three miles distant is another spring of like character.

If a chip were thrown into each of these and could float on uninterruptedly to the sea, they would reach their destination many thousands of miles apart. One is the fountain head of the Genesee River, which flows into Lake Ontario, and finally reaches the sea at the mouth of the Gulf of St Lawrence. The other is the fountain head of the Allegheny River, which unites at Pittsburg with the Monongahela to form the Ohio, and reaches the sea at the mouth of the Mississippi. The third is the fountain head of Pine Creek, which flows into the West Branch of the Susquehanna, and reaches the sea at Chesapeake Bay.

THOMAS W. LLOYD.

Montoursville, Pa

SILKWORM CULTURE

THE Department of Agriculture is investigating the possibilities of silkworm culture in the United States. It is hoped that it may in time be developed to such an extent as to prove of benefit to those members of families whose time is not altogether occupied in other ways. To persons wishing to experiment, and who can furnish proper food for the worms, the Department is distributing free of charge a small quantity of silkworm eggs and also a manual of instructions. The proper food for silkworms consists of leaves from the different varieties of white mulberry tree and the Osage orange. The paper mulberry (with the fuzzy leaves) is not suitable, nor is the common red mulberry. As the season is now open, applications for the eggs should be made at once, and must be accompanied by a statement as to the number and kind of mulberry trees or the amount of Osage orange which the applicant possesses; otherwise the eggs will not be sent. If the variety of the mulberry is not known to the applicant, a sample of large leaves should be sent to the Department. The Department of Agriculture buys the cocoons which the worms spin, paying for them (after they have been dried) 75 cents to $1 a pound, according to their quality. The work will prove an interesting pastime for women and children who can devote to it odd minutes during the day.

The first journey across Alaska, from Skagway to the Arctic Ocean, made by W. J. Peters and F. C. Schrader in 1901, is described by them in a handsome report just published by the Geological Survey. The journey involved a sledge trip with dogs of 1,600 miles, and from the Yukon to the Arctic Ocean was through country which had not been previously penetrated by white men. Nothing in Alaskan or Arctic exploration surpasses the harditude of these two men pushing across the unknown arctic wilderness and trusting to luck to meet a whaling ship on the coast to bring them home. Mr Schrader, with Alfred H. Brooks, was the Geological Survey explorer of Cape Nome in 1899, and with Gerdine, Witherspoon, and Mendenhall, of the Wrangell Mountains in 1900 and 1902. Mr Peters is at present with the Ziegler Polar Expedition as the representative of the National Geographic Society and director of the scientific work of the expedition.

An interesting comparison of the amount of goods shipped abroad from the different ports of the United States in 1903 and 1893 has been prepared by the Bureau of Statistics. New York, New Orleans, and Galveston show the largest gain. New York's exports have grown from 357 million dollars in 1893 to 516 millions in 1903; those of New Orleans, from 85 millions in 1893 to 150

millions in 1903; and those of Galveston, from 36 millions in 1893 to 144 millions in 1903. Baltimore shows an increase in exports from 75 millions to 84 millions; Boston, from 83 millions to 86 millions; Philadelphia, from 43 millions to 73 millions; Newport News, from 10 millions to 20 millions; Savannah, from 23 millions to 58 millions; San Francisco, from 29 millions to 32 millions; and Puget Sound, from 5 millions to 27 millions of dollars. Charleston, S. C., shows a decrease from 11 millions to 3.5 millions, and Norfolk from 11 millions to 9 millions. The proportion of imports entering these ports differs little from earlier years.

Frederick A. Walpole, the botanical artist of the Department of Agriculture, and a member of the National Geographic Society, died May 11, 1904, of typhoid fever, at Cottage Hospital, Santa Barbara, Cal. He was considered the best plant artist in the United States, his drawings having been used to illustrate various reports published by the Department of Agriculture and the Smithsonian Institution, as well as the narrative of the Harriman Alaska Expedition. The greater part of his drawings remain unpublished, including a remarkable series of colored paintings of the native poisonous plants of the United States now on exhibition by the Department of Agriculure at St Louis. Mr Walpole's death is regarded as an irreparable loss to botanical science. Mr Walpole was born in Essex county, New York, in 1861.

A New Pacific Coal Field.—The importance to the whole Pacific coast of an extensive deposit of good Alaskan coal that is accessible to the ocean can not be overestimated. Such a coal field, according to the report of Dr G. C. Martin, of the U. S. Geological Survey, is situated from 12 to 25 miles inland from Controller Bay, Alaska. It is in the valley of the Bering River, a good-sized stream which flows into Controller Bay east of Copper River. This coal area, as at present recognized, covers an area of 80 miles, the largest seam being 20 feet thick, and was surveyed by Dr Martin in 1903. The coal is hard bituminous.

A new meteorological observatory is to be established at Tortosa, on the eastern coast of the Spanish Peninsula, some 119 miles from Valencia. This new observatory, which is to be built by the Jesuits, will be known as the "Observatorio de Fisica Cosmica del Ebro" (Physical and Cosmical Observatory of the Ebro). The buildings will be erected in the form of a cross, comprising four main rooms, separated from each other, and several partly subterranean apartments reserved for the installation of instruments of exceptionally delicate construction.

The management and direction of the installation is to be entrusted to Father Cirera, a man who stands remarkably high among experts in the cosmical, meteorological, and astronomical sciences. He has spent the past four years in carefully studying the most noted observatories of Europe, after having established and directed for six years the magnetic department of the well-known observatory at Manila, which has rendered and continues to render such invaluable services to the navigators of all nations.

H. A. JOHNSON,
U. S. Consul, Valencia.

A Map of St Louis.—One of the most appropriate exhibits to be made by the U. S. Geological Survey at the Louisiana Purchase Exposition this summer will be a topographic map of the city of St Louis and its environs. Copies of this map, which is mainly a result of surveys made by Mr Charles E. Cooke, topographer, will be distributed gratuitously to Exposition visitors as a memento of the Survey's work.

GEOGRAPHIC LITERATURE

Webster's International Dictionary of the English Language. Being the authentic edition of Webster's Unabridged Dictionary, comprising the issues of 1864, 1879, and 1884, thoroughly revised and much enlarged under the supervision of Noah Porter, D. D., LL. D. With a voluminous appendix, to which is now added a Supplement of twenty-five thousand words and phrases, a Gazetteer of the world containing 25,000 names, etc., etc. W.T. Harris, Ph. D., LL. D., editor-in-chief. Pp. 2358. 12x9½x4½ inches. Springfield, Mass., U. S. A.: G. & C. Merriam Company. 1904.

To the reader of this Magazine the most useful feature of this new edition of Webster's International Dictionary is the completely revised "Pronouncing Gazetteer of 25,000 Place Names." During the past few years thousands of new towns have sprung into prominence in the Philippines, China, Siberia, South Africa, etc., many of which it has hitherto been impossible to locate, unless perhaps in some unobtainable official gazetteer. All these names with concise descriptions giving the results of latest geographical discoveries and of the censuses throughout the world in 1900 and 1901, have been included in the revised edition, so that for completeness and convenience Webster's Gazetteer is now unequaled. Every one will welcome the uniform spelling of place names, due to the wise adoption by the editors of the rulings of the U. S. Board on Geographic Names, of the Canadian Board on Geographic Names, and of the Royal Geographical Society. All questionable cases were referred to Henry Gannett, Chairman of the U. S. Board.

Another indispensable feature of the new edition is the inclusion in the Supplement of hundreds of new terms that have arisen in the many branches of geography during the past decade The editor for geology and geography was G. K. Gilbert; for meteorology, Gen. A. W. Greely; for agriculture, A. C. True.

The recent rapid changes and additions to the English language have striking evidence in the 25,000 words of the Supplement. These 25,000 names represent 10 years' growth in the English language—the thousands of new words that have come into use, the old words that have changed their meanings, and obsolete words that have been revived. Probably no equal period in the development of the English-speaking race has received so many new names. One reason that the past decade has been so prolific in creating names is the succession of new discoveries in all branches of sciences and life. Another is the closer union of all peoples, new relations and new conditions which require definition.

Some idea of the wealth in the volume may be obtained from the statement of the publishers that the amount of matter it contains would make 75 or more volumes such as are usually sold for $1 each. Notable features of work in addition to the Dictionary, Supplement, and Gazetteer are:

Colored plates of flags, seals, etc., of the nations and states, 8 pages; portrait of Noah Webster; preface by Noah Porter, D. D., LL. D.; memoir of Noah Webster; prefaces to various editions of Webster's Unabridged Dictionary; list of authors quoted as authority in this dictionary; brief history of the English language; Indo-Germanic roots in English; explanatory notes on the revised etymologies; guide to pronunciation; orthography; the metric system of weights and measures; explanatory and pronouncing dictionary of the names of noted fictitious persons and places; completely revised pronouncing biographical dictionary of 10,000 names; pro-

nouncing vocabulary of Scripture proper names; pronouncing vocabulary of Greek and Latin names; pronouncing vocabulary of common English Christian names; quotations, words, phrases, proverbs, and colloquial expressions, from the Greek, the Latin, and modern foreign languages; abbreviations and contractions used in writing and printing, also arbitrary signs used in writing and printing; 70 quarto pages containing 5,000 pictorial illustrations, in addition to the thousands of text figures in the Dictionary and Supplement.

Carpenter's Geographical Reader; Australia, our Colonies, and other Islands of the Sea. By Frank G. Carpenter. Illustrated. Pp. 388. 5½ by 7½ inches. New York: American Book Company. $0.60.

A well illustrated, well written, and trustworthy reader. It is the fifth book of Mr Carpenter's admirable series, the others, North America, South America, Europe, and Asia, being in general use throughout the United States. A volume on Africa is in press.

Handy World Atlas and Gazetteer. 3¾ x 6 inches. New York: F. Warne & Co. 40 cents.

For the price, this is an admirable pocket atlas. It contains 120 maps and 10,000 entries in the Gazetteer. The maps are by John Bartholomew & Co.

The Philippine Islands, 1493–1898. Volume XII. 1601–1604. By Blair and Robertson. Illustrated. Pp. 321. 6½ by 9½ inches. Cleveland, Ohio: Arthur H. Clark Company. 1904.

The documents contained in volume XII cover 1601–'03. The two notable events of this period are the great fire and the Chinese revolt, which ended in the slaughter or expulsion of all the Chinese on the islands. Frequent references are made to the raids of the Mindanao pirates. The special feature of the book is the first appearance in English of Chirino's "Relacion," giving an able description of the peoples, their customs, life, etc., and of the missions during 1595–1602.

Six Mois Dans L'Himalaya, Le Karakomin, et L'Hindu-Kush. Dr J. Jacot Guillamond. With maps and illustrations. Pp. 360. 6½ by 9¼ inches. Neuchatel. W. Sandoz, editeur. 1904.

This is the account of explorations in 1902 among the highest mountains of the world by the author and O. Eckenstein, A. E. Crowley, and M. G. Knowles. It is printed in large type and on heavy paper. The illustrations of scores of superb peaks and massive glaciers are wonderfully beautiful and impressive.

Early Western Travels, 1748–1846. Vol. II. John Long's Journal, 1768–1782. Pp. 329. Cleveland: The Arthur H. Clark Co. 1904.

John Long, to whose travels the second volume of this admirable series is devoted, was an Indian interpreter and trader. His travels covered the region of the Great Lakes and the country to the northward.

A biographical sketch of the author of each journal precedes it, and the notes and annotations are admirable, enabling the reader to follow the routes, filling in and amplifying the scanty references to incidents, customs, etc. The series of volumes will serve a very valuable purpose in rescuing from loss a body of early history of which our knowledge is very meagre. H. G.

Japan Today. By James A. B. Scherer. Illustrated. Pp. 323. Philadelphia: J. B. Lippincott & Co. 1904.

A series of sketches and descriptions, rather disconnected but very pleasantly drawn, by a teacher in the public schools of Japan. There is visible here, as in most recent books on Japan and her people, a notable tendency to exaggerate

their recent progress and achievements, even while admitting their faults. When it is stated in one breath that illiterate Japanese are practically unknown, and in the next that only about 10 per cent of the population attend school—*i. e.*, half the proportion of this country, where illiterates *are* found—one finds himself disposed to question other statements. The story of the growth of Japan during the half century of her emancipation is strange enough, without recourse to exaggeration of her present condition. H. G.

Handbook of Commercial Geography. By George G. Chisholm. 4th edition. Illustrated. Pp. 639. New York: Longmans, Green & Co. 1903.

This work, the pioneer text-book in commercial geography, was first issued in 1889, and has since held its position as the standard work on the subject. Since its first publication, and in some measure at least as a result, the subject of commercial geography has grown to great importance, and is now taught in most of our high schools and in many colleges. It is unnecessary to characterize this book, as it is well known wherever the English language is used and commercial geography is taught. It is sufficient to say that in its successive editions the author has kept pace with the development of his subject, and the book is still the standard authority.

Turkish Life in Town and Country. By Lucy M. J. Garnett. Pp. 336. 1904.

Austro-Hungarian Life in Town and Country. By Francis H. E. Palmer. Pp. 301. 1903.

The above volumes are parts of a series of "Our European Neighbors," edited by William H. Dawson and published by G. P. Putnam's Sons, New York.

Both volumes are interesting accounts of the home life of people little known to American readers. The first, besides treating adequately of the institutions of the country and the home life of its people, gives the reader a view of the harem and of the Sultan's household at Yildiz Kiosk. It tells also of the other peoples besides Turks who are under the Sultan's sway—the Albanians, Macedonians, Armenians, and Hebrews—closing with a chapter on the brigands, without which the story of Turkey would be incomplete. The reader feels that here he has a dispassionate account of the Sultan's peoples.

The story of the Austro-Hungarians is equally well told, and, while the home life of the various races which go to make up this strangely assorted monarchy is graphically described, much attention is given to the complex political conditions produced by harnessing together these incongruous peoples, Germans, Magyars, Slavs, and others, and to the economic condition of the peoples.

H. G.

ARTICLES FROM MAY MAGAZINES.

Geology and Geo-botany of Asia, Prince Kropotkin. Popular Science Monthly.

Japan of Today, Hiroshi Yoshida. New England.

Tasmania's Halcyon Isle, R. E. Macnaghten. Pall Mall.

Russia in the Far East, Count Cassini. North American Review.

England and Russia in Tibet, Oscar T. Crosby. Do.

Size of the World's Great Cities, A. T. Dolling. Strand.

The Italian Marshes, L. D. Handley. Outdoors.

The Fleet on the Labrador, Norman Duncan. Harper's.

Aeronautic Spiders, H. C. McCook. Do.

The Passing of Finland, Gilson Willetts. Everybody's.

Somaliland, R. A. M. Hardy. Scot. Geog. Journal.

Opal Formations of Australia, R. M. Macdonald. Do.

The Burden Bearers of the World. Outing.

On Lonely Bird Key, Herbert K. Job. Do.

The Two Pacifics: If Japan Should Win, Harold Bolce. The Booklovers' Magazine.

The Yellowstone National Park, Arnold Hague. Scribner's Magazine.

The Northeast Coast of Brazil in Ancient Cartography, Dr. Orville A. Derby. Science, April 29.

Japan and Korea, Colgate Baker. Pearson's.

The Birth of Great Trees, G. Clark Nuttall. Do.

The Siberian Railway. The World To-day.

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Hanging Valleys in the Finger Lake Region of Central New York, R. S Tarr. The American Geologist.

Germany in Southern Brazil, George A. Chamberlain. The Independent, May 5.

Savage and Civilized Dress, Edwin Swift Balch. Journal of the Franklin Institute.

Climatic Features of the Field of the Russo-Japanese War, Frank Waldo. Review of Reviews.

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CONSULAR REPORTS

Articles in recent consular reports of special note are :

Oil Fields and Petroleum Industry of Russia, no. 1941.

Development of East Africa, no. 1935.

German Merchant Marine, no. 1917.

Chinese Emigration, no. 1961.

Abyssinia, no. 1940.

French Fisheries of Saint Pierre and Miquelon, no. 1945.

American Trade in Manchuria, no. 1960.

Foreign Commerce of Argentine, no. 1947.

DECISIONS OF U. S. BOARD ON GEOGRAPHIC NAMES.

Approved January 6, 1904.

Allegrippis ; ridge in Huntingdon County, Pennsylvania (not Allegrippes nor Allegripus).

Beckley; pond in town of Norfolk, Litchfield County, Connecticut (not Blakley nor Blakeley).

Brannock ; bay, Dorchester County, Maryland (not Bronnack, Brannack,nor Brannocks).

Bumkin ; island, Higham Bay, town of Hull, Plymouth County, Massachusetts (not Pumpkin).

Celoron ; post-office and railroad station, Chautauqua County, New York (not Celeron).

Cienega del Gabilan ; land grant, San Benito County, California (not Sienega del Gabilan).

Dorseys ; creek on north side of Annapolis, Anne Arundel County, Maryland (not Graveyard, Dorsey, nor College).

Highland ; lake in town of Winchester, Litchfield County, Connecticut (not Long).

Inchwagh ; lake in Livingston County, Michigan (not Nitchwage nor Michuaga).

Lemon Fair ; river, Addison County, Vermont (not Lemonfair nor Lemonfare).

Morgan River; stream in Barkhampsted, Litchfield County, Connecticut (not Mohawk Brook).

Rocky Mount ; post-office, town, and township in Edgecombe County, and town and township in Nash County, North Carolina (not Rockymount).

Rosbys Rock; post-office and railroad station, Marshall County, West Virginia (not Rosbysrock nor Rosbbys Rock).

Sollers ; railroad station and point in Patapsco River, Baltimore County, Maryland (not Sollars nor Soller).

Spa ; creek on south side of Annapolis, Anne Arundel County, Maryland (not Spaw nor Spat).

Starvout ; post-office, settlement, and creek, Douglas County, Oregon (not Starveout nor Starve Out).

Approved April 6, 1904

Hanna ; glacier, west slope of Mount McKinley, Alaska (not Peters).

John Day ; river in western Wyoming (not John Days, John Day's, John Grays, John Gray's, John Gray, Greys, nor Grey's).

Keshequa ; creek in Livingston County, New York (not Coshaqua, Cashaqua, Kishaqua, nor Kushaqua).

Landenberg ; town in Chester county, Pa. (not Landenburg).

Umsteads ; point on south side of Magothy River, Anne Arundel County, Md. (not Huddle, Huddle's, Huddles, Umphreys, Umfreys, nor Ulmsteads).

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VOL. XV, No. 7 WASHINGTON JULY, 1904

THE NATIONAL GEOGRAPHIC MAGAZINE

GOVERNING THE PHILIPPINE ISLANDS*

BY COLONEL CLARENCE R. EDWARDS, U. S. ARMY,

CHIEF OF BUREAU OF INSULAR AFFAIRS

ONE of the wisest provisions contained in President McKinley's instructions to the Taft Commission, which has gained congressional approval, was the provision that appointments should be made by the civil governor, by and with the advice and consent of the Philippine Commission. Under this authority the Commission has enacted civil-service legislation which I believe is as practical and effective a civil service as exists in any country today. It is more comprehensive than the United States statutes, and the result has been, since I have been the chief of the Bureau, that not one single instance can I recollect where appointments have been made contrary to law, contrary to the one idea in view—merit and the best interests of the Philippine service and rights of the Filipino. I hardly know the politics of an employé in the Philippine service except those of the Philippine Commission, and I call to your attention the fact that the Senate has already confirmed, to take effect the first day of February, the nomination as civil governor of the Philippines of the Hon. Luke E. Wright, a prominent Democrat of Tennessee. The only appointments made by the President are the civil governor, vice-governor, members of the Commission, and supreme court of the Philippines.

This Bureau is charged with the labor in the United States incident to the selection of appointees upon the certification of the United States Civil Service Commission after examination, and the arrangement for their transportation to the Philippines, as well as matters relating to appointment in the corps of teachers, the judiciary, and positions not subject to the requirements of the civil-service law.

The inauguration of complete civil government in the Philippines, occurring as it did simultaneously with the muster out of the twenty-four volunteer regiments of infantry serving in those islands, resulted in a great number of the personnel of such regiments being appointed to civil positions, as those honorably discharged

*Concluded from "The Work of the Bureau of Insular Affairs," by Colonel Edwards, June, 1904.

from the Army and Navy constituted a preferred class, and with the few appointments, generally of a highly technical or scientific character, necessary to be made in the United States, the United States Civil Service Commission conducted the preliminary inquiries and advised this Bureau of the names of the persons to be appointed, whereupon transportation was arranged.

At this time, however, more than two years subsequent to the muster out of these volunteer regiments, there is not material available in the islands for appointment to many civil employments, which has made it necessary that such appointments be made in the United States, both to vacancies caused by resignations and to the newly created positions caused by the extension of civil government throughout the archipelago.

Furthermore, on September 1, 1903, the corps of American teachers employed in the insular civil service became subject to civil-service rules, and since that time—that is, within the past four months—over one hundred and fifty school teachers alone have been selected and appointed under competitive civil-service examination.

The Philippine laws require that in addition to the general labor incident to appointments each appointee execute a contract with the Insular Bureau, in legal terms, to comply with certain requirements of that service. Appointments have been made to all classes of positions, ranging upward from that of clerk and including many of a scientific, technical, or professional character, as well as trades positions. Difficulty was experienced in properly filling a large number of newly created positions of a highly scientific and technical character incident to the development of the work relating to the laboratory and agricultural bureaus in the islands. The Bureau has had recourse to forty-two different eligible lists of the Civil Service Commission in making appointments within the past year, aside from the fact that many appointments have been made by transfer of persons already in the United States service, and to the judiciary, which is not subject to civil-service requirements. However, the number of persons appointed under competitive civil-service examination during the past year was about 400.

All insular employés on leave of absence in the United States are required to report promptly in writing to the Insular Bureau and look to that office for arrangements for their return to the islands.

During the past year the Bureau was able to persuade the United States Civil Service Commission to recommend to the President an amendment to the civil-service rules which made it possible for a person who had rendered loyal and faithful service in the Philippines to be eligible to transfer to the United States service. Such a step tends to the establishment of a system of ultimate reward at home for efficient service in the insular possessions. The Civil Service Commission, however, only issues such certificates upon the statement of this Bureau of a clean record in the Philippines.

On account of the crowded condition of the transport service, which is maintained primarily for the accommodation of the military, the Bureau entered into a contract with the large railway and steamship lines whereby it enjoys an economical rate from all points in the United States to Manila and return for the benefit of insular appointees, as well as members of their families. A system of transportation orders, as well as their details, have been worked up and about fifty or sixty persons are now being monthly booked from various points in the United States and transported to Manila via commercial lines.

Deaths of all insular employés, from whatever causes, are promptly reported to the Insular Bureau by cable, and

INSULAR NORMAL SCHOOL—GIRLS' DORMITORY.

thereupon it assumes the obligation of advising the nearest of kin of such employé of all particulars relating to the death, the conditions under which the remains may be returned, and finally, after complying with the legal requirements as to proofs of heirship, the absolute transmission of the estate, if any, is made. This grows out of the fact that under Philippine legislation the treasurer of the Philippine Islands becomes the administrator of the estates of all Philippine employés within certain limits, and this Bureau is his instrumentality in this country.

EDUCATION OF FILIPINO YOUTHS IN THE UNITED STATES

The question of the bringing to the United States of Filipinos for education in this country has long been the subject of much discussion and correspondence both by the Philippine government and by this Bureau. Last summer the Philippine Commission passed an act to carry into effect the policy which had been decided upon, with a proviso that upon the return of such students they enter the civil service of the islands. There are at the present time in the United States ninety-eight Filipinos to be educated as authorized by this act. All arrangements for their reception and transportation to southern California were made before their arrival in the United States. They are now placed in the first grammar, high schools, and colleges in that section to avoid the rigorous climate of the East during their first winter.

This work is by the act of the Philippine Commission under the special supervision of the Bureau of Insular Affairs, and the expenditures in the United States in connection with this work are payable out of funds in the custody of the disbursing agent of Philippine revenues stationed in this Bureau. The agent who accompanied these students to the United States has in the last few days made his first quarterly report as required by the Philippine act under which he is serving. I believe it would interest you to quote his conclusion of this report:

"In conclusion, it is especially desired to call the attention of the educational authorities of the Philippine Islands to the necessity, in the selection of students to be sent to America, for exercising the greatest care. The standard raised by those who have already come to America should be upheld. The exceedingly favorable impression created by the members of the first expedition, without exception, should not be impaired. The Filipino students now here are cited continually by parents and by teachers to their young American associates as models of gentleness, thoughtful politeness, studiousness, and of seriousness of purpose. Right here I desire to say that no other class of Filipinos whom I have known have in any degree compared with the Filipino students sent to America in their appreciation and gratitude for the benefits conferred upon them, for the forbearance and patience shown them, and the opportunities offered them for progress by the government. I have reports from their teachers and housekeepers at every place that the danger is not that they will study too little, but that they will study too much. They were uniformly successful in the examinations held by their schools just prior to the holidays, despite their late entrance to the schools and the short time that they have been studying their texts in English. They are all working with splendid seriousness for the accomplishment of the lofty purposes for which they are in this country, and I only ask that as good material be furnished in the future; that not one young man or young woman in whom the fullest confidence may not be placed, and whose fitness, mental and physical, is not of the very highest order, be sent by the government for education

IBILAO HUNTER IN RAIN COAT AND HAT OF DEER HIDE, MOUNTAINS OF EASTERN NUEVA VIZCAYA.

SULU MORO MAN, COARSE TYPE.

in the United States. There is no scarcity of such material, and if it be sent I feel that there can be no question as to the final result."

PHILIPPINE CURRENCY

As an illustration of how both Washington and Manila work through the Bureau, let me make mention of the work necessary to be performed in the United States in carrying out the orders of the Secretary of War and the enactments of the Philippine Commission putting into effect the act of Congress providing for a monetary system in the Philippines, which had been under consideration by Congress for two years.

Under the authority of sections 76 to 83, inclusive, of the Philippine government act and of the act entitled "An act to establish a standard of value and to provide for a coinage system in the Philippine Islands," approved March 2, 1903, by instructions from the Philippine government the Bureau supervised the coinage of 14,145,000 silver pesos, 3,100,000 50-centavo pieces or half pesos, 5,350,000 20-centavo pieces, 5,100,000 10-centavo pieces, 8,850,000 5-centavo pieces, 10,600,000 1-centavo pieces, 11,950,000 half-centavo pieces, making an aggregate in face value of 17,883,250 silver pesos, each of the face value of one-half an American gold dollar and having an aggregate face value of $8,941,625 gold money of the United States.

The coins were made from designs by Melecio Figueroa, a Filipino artist of distinction, and both in the artistic quality of the designs and in perfection of workmanship they compare favorably with anything of the kind ever done in America. The silver bullion purchased for this coinage amounted to 13,520,895.82 ounces. The cost of the bullion amounted to $7,372,990.11. Of the amount purchased, 1,115,234.52 ounces were purchased from the Mexican Pious Award fund in the hands of the Department of State. The remainder was purchased from various firms and corporations upon offers tendered twice a week in response to a public invitation.

The total quantity of silver bullion actually consumed in making the coins above specified was 13,478,448.07 ounces and the cost thereof $7,342,588.89.

The purchase of bullion for the present has been suspended. In the meantime the old Spanish-Philippine coinage is being collected and shipped to the United States for recoinage. It is estimated that there are some 12,000,000 pesos of this coinage. Mexicans were demonetized on January 1.

The price at which this silver bullion was purchased ranged from 49.10 cents per ounce to 60.47 cents per ounce. The average price paid was 55.193 cents per ounce. This makes the cost to the Philippine Government of the silver in each peso coined equal to 43.05 cents. The difference between the actual cost of the bullion consumed in making the coins above mentioned, including the cost of base metal for alloy and minor coins, and the total face value of the coinage is $1,495,644.85. The total cost of coining, transportation, insurance, packing, and miscellaneous expenses was $256,930.35, leaving a seigniorage or profit to the Philippine Government, consisting of the difference between the face value of the new coins and the total cost of the new coins delivered in Manila, amounting to $1,238,714.50. This sum will go into the special fund for the maintenance of parity between the new coins and the money of the United States.

Section 8 of the act of March 2, 1903, authorized the treasurer of the Philippine Islands, in his discretion, to receive deposits of the standard silver coins of 1 peso in sums of not less than 20 pesos, and to issue silver certificates therefor in denominations of not less than 2 nor more than 10 pesos, retain-

ing the deposited coin in the Treasury "to be held and used for the payment of such certificates on demand, and for no other purpose," thus supplying for public convenience government notes representing silver coin actually held by the government as against the notes.

Under this provision certificates have been engraved, printed, and delivered at Manila representing 10,000,000 silver pesos. Of these, 4,000,000 were in 10-peso notes, 4,000,000 in 5-peso notes, and 2,000,000 in 2-peso notes. This work was admirably done by the very considerate and public-spirited coöperation of the Bureau of Engraving and Printing. The 10-peso notes bear the engraved vignette of President Washington; the 5-peso notes, of President McKinley, and the 2-peso notes of the Philippine patriot and poet Rizal.

The cost of material, engraving, printing, transporting, and insuring the ten million pesos of silver certificates has been $39,365.36.

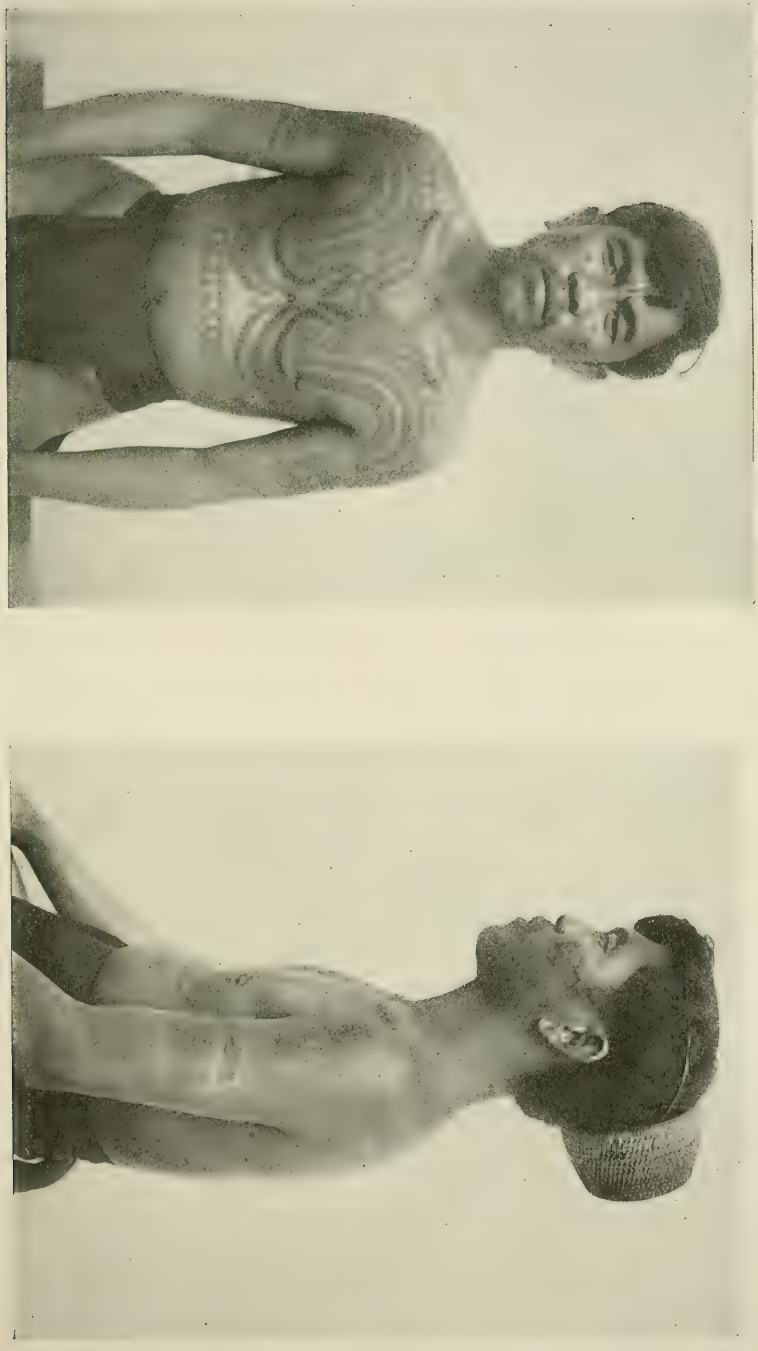
Issue of Certificates of Indebtedness.—The money for the purchase of bullion and expense of coinage was furnished in part from the general funds of the Philippine Government and in part by the issue of certificates of indebtedness under the authority of section 6 of the Philippine coinage act of March 2, 1903. That section provides that in order to maintain parity between said silver Philippine pesos and the gold pesos provided for by the act, the Philippine Government may issue temporary certificates of indebtedness to the extent of $10,000,000, or 20,000,000 pesos, running not more than one year and bearing interest not to exceed 4 per cent; and it provides that the proceeds of such certificates shall be used exclusively for the maintenance of said parity, except that a sum not exceeding $3,000,000 at any one time may be used as a continuing credit for the purchase of silver bullion.

Under these provisions certificates of indebtedness payable one year after date and bearing 4 per cent interest have been issued and sold in the United States to the amount of $6,000,000. Three million dollars thereof, issued specifically for the purchase of bullion, were sold on the 20th of April, 1903, at a premium of 2.513 per cent. The other $3,000,000 thereof, issued specifically for the creation of a gold reserve fund for the maintenance of parity, were sold on the 25th of August, 1903, at a premium of 2.24 per cent, making an average premium of 2.3765 per cent and making the interest charge to the Philippine Government for the use of the money borrowed for one year 1.6235 per cent, or in round figures 1⅝ per cent.

These sales were made upon public advertisement for bids, and the extraordinarily favorable result was due not merely to the credit of the Philippine Government, but to the fact that the Secretary of the Treasury authorized the War Department to announce that the certificates would be received by the Treasury Department as security for the deposit of United States funds in the national banks under certain specified conditions.

Competition between the two depositaries of insular funds in the city of New York, which maintain branches in Manila, had been previously invited, and as the result of this competition the $6,000,000 thus borrowed by the Philippine Government at 1⅝ per cent per annum was deposited with the Guaranty Trust Company of New York at 3½ per cent interest on daily balances.

The ultimate result of the two transactions is that the Philippine Government will have obtained the money to carry through the new coinage without any interest charge, and will make an interest profit on the indebtedness contracted for that purpose.



BONTOK IGORROTE WITH ELABORATE TATOOING OF THE HEAD HUNTER.

PHILIPPINE LAND PURCHASE

Friar Bonds.—Another example of finance by this Bureau is the recent sale of bonds to pay the friars for the surrender of their lands to the public domain of the Philippine Government. At the end of the last year, just before Governor Taft started for Washington, we received a cablegram to the effect that his labors for the past four years had been successful; that a definite agreement had been reached, and that the price to be paid for the lands that would settle this troublesome question had been decided upon. That act of July 1, so often mentioned, providing for a temporary civil government for the Philippine Islands, authorized a bond issue to provide funds necessary for this payment. A prospectus or circular was immediately made out offering these bonds to the public, to the highest bidder. Bids were opened January 11 last, and it was found that the offer of 107.577 for the entire seven million dollars' worth of bonds tendered would give a premium of $530,390, which was the most advantageous to the Philippine Government by a little over $75,000. The award was therefore made to the syndicate making this bid. The bonds were registered in denominations of ten thousand and one thousand dollars, bearing respectively the vignettes of President McKinley and Vice-President Hobart.

SUBANON WOMAN, SHOWING NATIVE SKIRT OR "TAPIS," WOVEN OF HEMP.

On February 1 the bonds will be delivered to the successful bidders, and the money derived therefrom devoted to the purchase of the lands according to the agreement made. The purchase price was some $7,240,000. Seven millions of the bonds were sold, leaving a surplus on account of the premium realized of approximately $300,000. This work, under the direction of the Secretary of War and the authority of the act of the Philippine Commission, fell to the lot of this Bureau, whose ability to perform the task under its organization and with the experience gained in previous transactions of this kind in the past can be best judged by the results obtained.

PURCHASE OF SUPPLIES FOR THE PHILIPPINE GOVERNMENT IN THE UNITED STATES

All supplies for the Philippine Government bought in the United States are purchased by this Bureau. This work is allotted to one of its divisions. To this division is attached, as I have stated before, a fully equipped purchasing agency in New York, where articles of every kind and description are purchased after fair competition, f. o. b. ship's tackle, insured, and shipped to the Philippine Islands. Payments for the same are made by a duly appointed disbursing officer of Philippine funds, an official of this Bureau stationed in Washington. All requisitions for supplies, after approval by the civil governor of the Philippines, are sent to the Bureau and there carefully entered in ledgers, and when the purchases are made the vouchers are carefully audited and compared as to rates, prices, and methods, the check in payment drawn only after order of the Chief of the Bureau, and accounting made to the Auditor of the Philippine Islands, who is the final authority as to the propriety of the disbursement. This disbursing officer paid some 4,000 accounts during the past year, amounting to some $8,000,000.

STATISTICS, COMMERCE, AND IMMIGRATION

One division of the Bureau is charged with the tabulation of all commercial statistics in the Philippine Islands, direct reports being made to the Bureau by all collectors of customs on prescribed forms and blanks. These statistics are published in monthly summaries of commerce showing all details of the import and export trade. Such compilations were made of Cuba and Porto Rico while under the jurisdiction of the War Department. They have been the only official data for the information of Congress on which were based the resultant tariff laws and other legislation relating to commerce and revenue.

CAPTURED INSURGENT DOCUMENTS

In one division of this Bureau there are filed some 200,000 documents which were captured at different times from the insurgents in the Philippines. Few of them are of value as military records, but they contain the material for a history of the insurgent government both during its open existence and during the ensuing guerrilla warfare. They include many of the orders and regulations and much of the correspondence of the insurgent officers, and throw much light upon many important matters of which, from an American point of view alone, but a partial understanding can be obtained. These papers, since their receipt in October, 1902, have been carefully arranged, recorded, and filed, and those of special interest indexed and translated. It seems well worth while to print the more important of these documents with such explanatory notes as can be furnished by officers who are familiar with the transactions to which they relate.

The Secretary of War, agreeable to my recommendation, has asked Congress for the necessary appropriation to print this insurgent history, which will be comprised in about five volumes of 500 pages each, and will furnish an interesting chapter of the first period of our occupation of the Philippines.

PHILIPPINE EXHIBIT AT LOUISIANA PURCHASE EXPOSITION

In the World's Fair grounds at St Louis there are some forty-two acres of ground reserved for the Philippine exhibit. Today there are some fifteen large buildings, typical of the Philippine Islands, in process of completion. It is the intention to bring over some 1,200 natives of the Philippine Islands and about 10,000 tons of material.

The Philippine Commission has already appropriated $500,000 and the Exposition Company $200,000 for the payment of the expenses of this exhibit. It is believed that this will be the most

interesting feature of that expansion fair and furnish the opportunity for a large number of Filipinos to become acquainted with the United States and its institutions, as well as to furnish an object lesson to millions of Americans of the history and resources of the Philippines and their development under American occupation, and give opportunity to become acquainted with the Filipino people.

A battalion of 400 native troops, paid out of funds of the United States and part of the Regular Army of the United States; two companies of native constabulary, whose maintenance is at the expense of insular revenues, and the official constabulary band of some eighty pieces will also be stationed at St Louis during the term of the fair. About fifty prominent Filipinos, selected from the various provinces throughout the islands, will be present, and a few representatives of the non-Christian tribes will also be part of the exhibit. The Bureau of Insular Affairs is charged with this work in the United States.

PHILIPPINE PRINTING PLANT

Government printing in the Philippine Islands during the past two years has been done by the public printing office of the Philippine Government. This is as thoroughly well equipped printing plant of its size as, I believe, exists in the world today, and I am told by experts that it is even more complete in its accessories than the public printing plant in this city. It is equipped with the most up-to-date labor-saving machinery that could be purchased, among which is a full equipment of linotypes. The purchase of all the machinery and supplies, as well as the selection of the original employés, were made by this Bureau.

This printing office is part of the educational system of the Philippines—an industrial school, of which, with the exception of the foremen instructors, the students, or personnel, are made up of native Filipinos. Experts tell me that the printing it turns out is equal to anything done in the United States.

PUBLIC DOCUMENTS

In the past two years we have made a collection of all official documents in any way relating to our insular possessions. This compilation embraces over 6,000 separate publications and has been bound together in about 200 volumes. That this voluminous compilation might be consulted to advantage, an index is now nearing completion which it has taken some two years' work to prepare. It will contain references, not alone to the insular compilation, which is directly available only to those who possess the same, but also to the congressional and other documents, by title, number, and page. It is purposed to print this index and thereby make this *terra incognita* of public documents available to every one.

During the short life of the Bureau some seventy-five congressional resolutions of inquiry have been passed and referred to it, the response to some of which required a large number of clerks for many months. The answer to one resolution alone resulted in five large printed volumes.

The Bureau has prepared many publications. I do not dare to even mention them, so great is the present extent of this paper.

Association with this work of government in our insular possessions becomes absorption. It is dangerous to give such a one a chance to talk about it. The result, I am afraid you will find, is prolixity. Still, when I think how hard we have tried and of the faithful industry rendered by my various assistants, many of whom have become experts in the novel work assigned them, I cannot help but believe that I have been modest in their representation in failing to mention the many things the Bureau has done and which an official record might properly contain.

FORECASTING THE WEATHER

BY watching the clouds, the direction of the wind, the amount of moisture perceptible in the air, and other local signs, any person may become a tolerably good weather prophet. Some of the principal phenomena that must be noted and in what manner are described in a recent report by Alfred J. Henry, Professor of Meteorology in the United States Weather Bureau.

CLOUDS

Clouds are formed from the moisture that is always in the air in varying quantities, even over the desert. Like the air itself, the moisture that is within it is invisible so long as it remains in the form of a gas. When a mass of air is cooled by any means whatsoever, a portion of its water vapor is condensed and becomes visible—a mist or cloud is formed. A familiar illustration of cloud formation in nature is afforded when a current of warm, moist air strikes a cold mountain. The colder surface of the mountain condenses some of the moisture that is in the air, forming a cloud which frequently obscures the top of the mountain and floats away in the prevailing winds. This simple phenomenon indicates to an observer on the leeward side of the mountain that a warm, moist current of air, with probably rain or snow, is approaching. In some parts of the world the formation of a cloud cap on a mountain top is not an indication of precipitation; yet in the majority of cases it is believed to be a reliable prognostic of falling weather. In general, the formation of cloud after a clear spell is the first sign of coming rain. Unfortunately there is no definite interval between the time of the first appearance of clouds and the occurrence of rain. Rain may not fall for several days after the first appearance of clouds, and, on the other hand, it may begin within two or three hours after the first cloud makes its appearance.

The various cloud forms generally observed in the United States, with their especial significance, are given in figures 1–6.

THE TEMPERATURE AND MOISTURE OF THE AIR

An increase in the amount of moisture in the air is indicated in various ways. It is especially noticeable to the senses when coupled with a high temperature. Man does not need a thermometer to tell him that the air is oppressively warm, nor a hygrometer to tell him that there is an unusual amount of moisture present. A pitcher of ice water on a hot summer day is not a bad sort of hygrometer. The pitcher is naturally cooler than the surrounding air, and consequently some of the water vapor in the air is condensed and collects on the outside of the pitcher. It will be remembered that water vapor changes to the liquid state when the air is cooled below a certain point. The principle illustrated by the pitcher of ice water is repeated on a grand scale in nature every time rain or snow falls. First, there is the cooling of the air and the formation of cloud, the latter being composed of minute particles of water; second, there is the further cooling of the cloud mass, so that its particles join to form small raindrops, which fall to the earth by their own weight. When a rain cloud strikes the top of a mountain, rain does not necessarily fall, but small mist-like particles of water are deposited on the relatively colder surfaces of the rocks and other objects on the mountain sides and top. These particles coalesce and run down the sides of the objects on which they are deposited precisely as frequently happens on a pitcher of ice water on a warm, humid

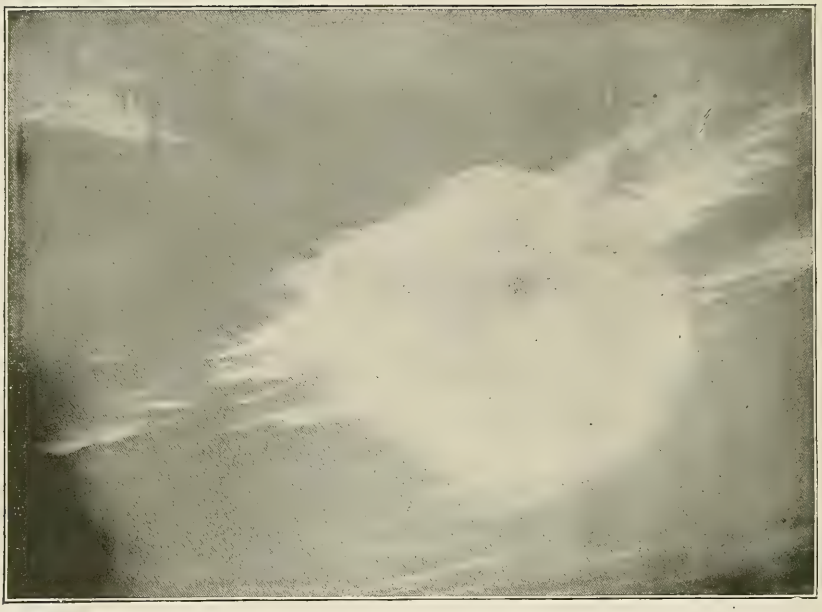


Fig. 1.—Cirrus Clouds

Light, feathery clouds that float at an elevation of 4 or 5 miles above the earth's surface. When in the form of plumes with frayed and torn edges increasing cloudiness and rain or snow are indicated.

Photos by Henry

Fig. 2.—Cirrus, Merging into Cirro-Stratus Clouds

A transitional form often seen when rain or snow is approaching. The cloud layer gradually thickens until the sky is obscured

day. If the mountain were warmer than the cloud mass there would be no condensation, but some of the moisture of the cloud would be evaporated and float away in the prevailing winds.

An unusual amount of moisture in the air in summer produces a feeling of closeness; physical labor is more enervating that when the air is dry and crisp. The change from sultry, oppressive weather is nearly always brought about by a series of thunderstorms, sometimes lasting over two days.

Summarizing the indications that may be drawn from the temperature and moisture of the air, it would appear that an increase in the amount of moisture in the air is a sign of a change from fair to foul weather, both winter and summer. In the colder months an increase in the temperature of the air above the average for the season, coupled with an increase in moisture, is a sign of rain or snow within twenty-four to forty-eight hours. In the summer an increase of temperature alone is not always an indication of rain; but these are not infallible rules. The old proverb, "All signs fail in dry weather," is as true today as when first formulated.

THE WIND AND ITS SUCCESSIVE CHANGES

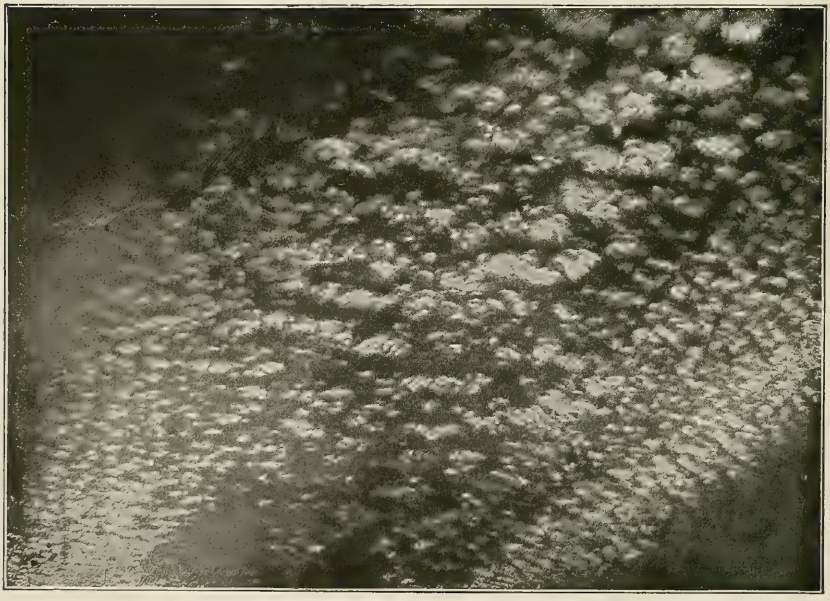
The wind is less prophetic in character than the clouds, since it is affected by the form of the land over which it blows. Thus it has a tendency to blow up a valley in the daytime and in the contrary direction at night, no matter in what direction the valley may extend. Winds also have a tendency to blow toward and up the sides of a mountain slope in the daytime and down the side of a mountain at night, and this movement of the air generally extends for some distance out from the foot of the mountain on the level slopes. There are also the well-known land and sea breezes of all countries, where during the twenty-four hours of the day the temperature of the land becomes alternately warmer and colder than that of the sea. These winds (valley, mountain, land, and sea breezes) are called diurnal winds. They are caused by differences in temperature that are not general, but confined to the valley or mountain slope of a particular locality. In order that these differences of temperature may arise there must be clear weather and unobstructed sunshine. It is easily seen, then, that all such winds must be most active in fair weather, and that when they cease, or fail to appear at the usual time, the atmosphere as a whole must have come under an influence greater than that which produced the diurnal winds.

In the open country or other exposed situation where the true direction of the wind can be determined, it should be noticed, first, what is the prevailing direction of the wind in fair weather, and what is the direction from which storms usually come. The direction of the wind during the twenty-four hours immediately preceding the storm should be especially noticed. To do this a short journal or diary of the weather should be kept. The direction of approach of storms in the United States varies in different localities. It is quite important that each observer determine for his immediate neighborhood the shift of the wind with the approach of storms, during the colder months at least.

In the warm months the winds are light and rather variable, and changes in direction have not the same importance as in the colder months. The rain of summer generally occurs in connection with thunderstorms; it will be found that these are most frequent for a certain direction and with the wind in a particular quarter. Beyond the fact that more thunderstorms come from a westerly quarter than from any other direction, little can be said that will be of value in forecasting their approach by the direction of the surface winds only. The coming of a thunderstorm can generally

Fig. 3.—Fair-Weather Cumulus Clouds

These clouds, it should be observed, have level bases and rounded tops, without the dome-like structure of figures—a type of cloud often seen after a spell of rain.



Photos by Henry

Fig. 4.—Cirro-Cumulus Clouds

Small round masses of clouds, usually at an elevation of 4 or 5 miles above the earth's surface. These clouds are typical of fair weather

be foretold a few hours in advance by the form and movement of the clouds.

In the colder months, viz, November, December, January, February, March, and April, the winds are stronger than at other seasons of the year, and storms also move with greater rapidity. The signs of falling weather in the colder months are the formation of a high sheet cloud covering the whole sky, an increase in the temperature and moisture of the air, and the change of the wind to some easterly quarter. The precise direction that the wind takes, whether northeast, east, or southeast, varies for different localities and the direction from which the storm is approaching. In New England, the Middle States, and the Ohio Valley northeasterly winds precede storms that approach from the southwest, and southeasterly winds precede storms that approach by way of the lake region. On the Pacific coast southeasterly and southerly winds precede rain storms. In Wyoming and other Northwestern States the heavy snowstorms of winter and spring generally come from the north or northwest with a strong wind from the same direction. The direction of the wind depends very much on the position of traveling storms that pass across the country.

The storms of the cold season have certain well-marked characteristics that should be easily recognized by every worker in the open air. These are: (1) The changes in the aspect of the sky; (2) the direction of the wind before, during, and after the storm; and (3) the shift of the wind, whether with or against the sun.

The clouds that precede the storm by from twenty-four to thirty-six hours are almost invariably light, wispy cirrus, of the general character shown in Fig. 1. Soon after the appearance of clouds of this class a sheet cloud forms at a slightly lower elevation and gradually thickens until the sun is hidden. Figure 2 illustrates the sheet cloud in the first stages of formation.

The subsequent clouds are much darker than those above mentioned, and appear to form at much lower elevations. When the sky becomes overcast the wind generally freshens, the temperature rises, and the air becomes humid; in popular speech, "it feels like rain."

LOW PRESSURE AND HIGH PRESSURE

The weather experienced from day to day depends upon the frequency and the course followed by areas of low pressure and the succeeding areas of high pressure which generally follow them. These are exceedingly variable both as to direction and rate of movement. Some move rapidly from the northeastern Rocky Mountain slope to the maritime provinces of Canada at a uniform rate, while others have a rapid rate of progression at the beginning, but quickly slow down and finally cease to move. There are, however, certain characteristics possessed by both highs and lows, which, if once fully understood, would greatly assist the individual observer in making a forecast of the weather for the morrow. Figure 8 is a reduced copy of the daily weather map of December 15, 1892, and is introduced to illustrate some of the characteristics above mentioned.

If we divide the diagram into four equal parts by lines passing east and west and north and south through the word *low*, and calculate the average temperature for each part or quadrant of the oval figure, we will find it to be 17° for the northwestern quadrant, 50° for the southwestern, 59° for the southeastern, and 35° for the northeastern. The distribution of temperature is also shown by the dotted lines (isotherms). In the upper left-hand corner of the diagram the temperature is 10° below zero (—10); between that line and the one next below, temperature varies from 10° below to zero, and so on until the

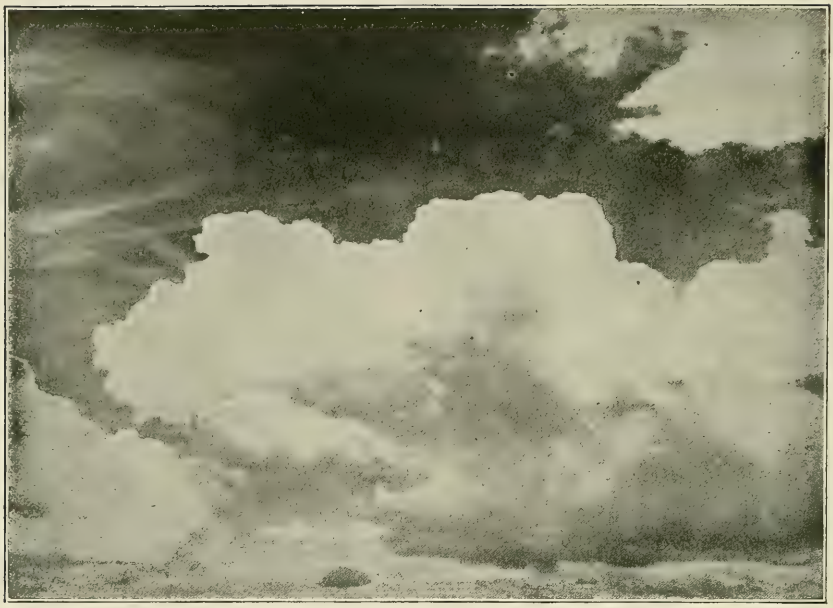


Fig. 5.—Cumulus Clouds

Cumulus clouds, as in the above, illustrating the formation of a central core of ascending warm air, generally precede local rains or thunderstorms by a few hours.

Photos by Henry

Fig. 6.—Near View of Large Cumulus Clouds

The small detached clouds on the lower left-hand margin of the cloud are almost invariably seen in advance of thunderstorms. Cumulus clouds, like those shown, rarely give rain at the point of observation, since their prevailing drift in these latitudes is eastward.

lower left-hand corner is reached, where it will be noticed temperature is 60° above zero. On the lower right-hand corner temperature is only 40° above zero. So far as temperature is concerned, therefore, we note that the right-hand* side of an area of low pressure is warm and the left cold.

The direction of the wind is shown by the small arrows in different parts of the diagram. These, it will be noticed, winds have a general southerly direction, in the northeast quadrant easterly winds prevail, while in the northwest and southwest quadrants the winds are mostly northwest to west. An observer stationed in lower Michigan at the point *A* will have fresh easterly winds, shifting as the storm center approaches him around to the south by way of southeast, and as the center passes him shifting still farther to the west or northwest.

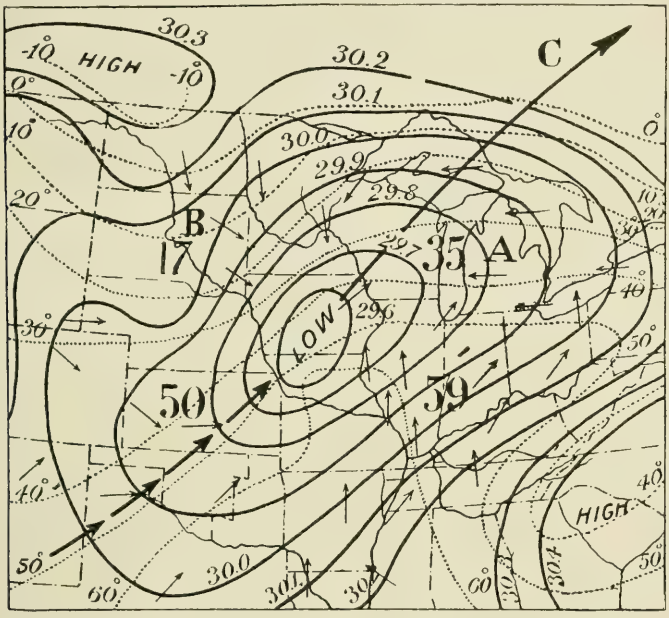


Fig. 7.—Weather Map (reduced) of December 15, 1892, Showing Typical Winter Storm

are disposed about the center of the storm (the inmost oval marked "Low") in a rather orderly system. The wind does not blow directly toward the center, but rather spirally about it, as discovered a little more than half a century ago. In the southeast quadrant the This is what is meant by "shifting with the sun." On the other hand, an observer in South Dakota at the point *B* first experiences a wind from the north, and as the storm center approaches and passes him the wind backs to the west by way of northwest, and this is the meaning of the term "shifting against the sun, or backing." The weather experienced in the two locations, *A* and *B*, will differ as regards both temperature and precipitation. At station *A* the tem-

* A person standing in the center of a storm, facing in the direction in which the storm is moving, will have the warm side on his right hand and the cold side on his left and in the rear.

perature will rise, and it will continue high until after the center of the storm has moved, say to *C*. With the shift of the wind to the northwest the temperature will begin to fall and the downward tendency will continue for twelve to twenty-four hours. The observer at station *B* will experience cold weather from the start, but the fall in temperature will not be quite so great as at station *A*. At station A the storm will begin with a warm rain, turning to sleet and snow as the center passes and the wind shifts to a westerly quarter. At *B* the precipitation will be mostly in the form of snow.

The foregoing few generalizations apply equally well in all parts of the country east of the Rocky Mountains. They will be found most useful, however, in the middle and upper Mississippi and Ohio valleys, the lake region, and the Middle States. As soon as they are thoroughly understood the local observer will be able to detect in the atmospheric changes, apparent to the eye or apprehended by the sense of feeling, the coming of an area of cloud and precipitation with its attendant whirling winds—warm on the front and right-hand side and cold in the rear and on the left-hand side.

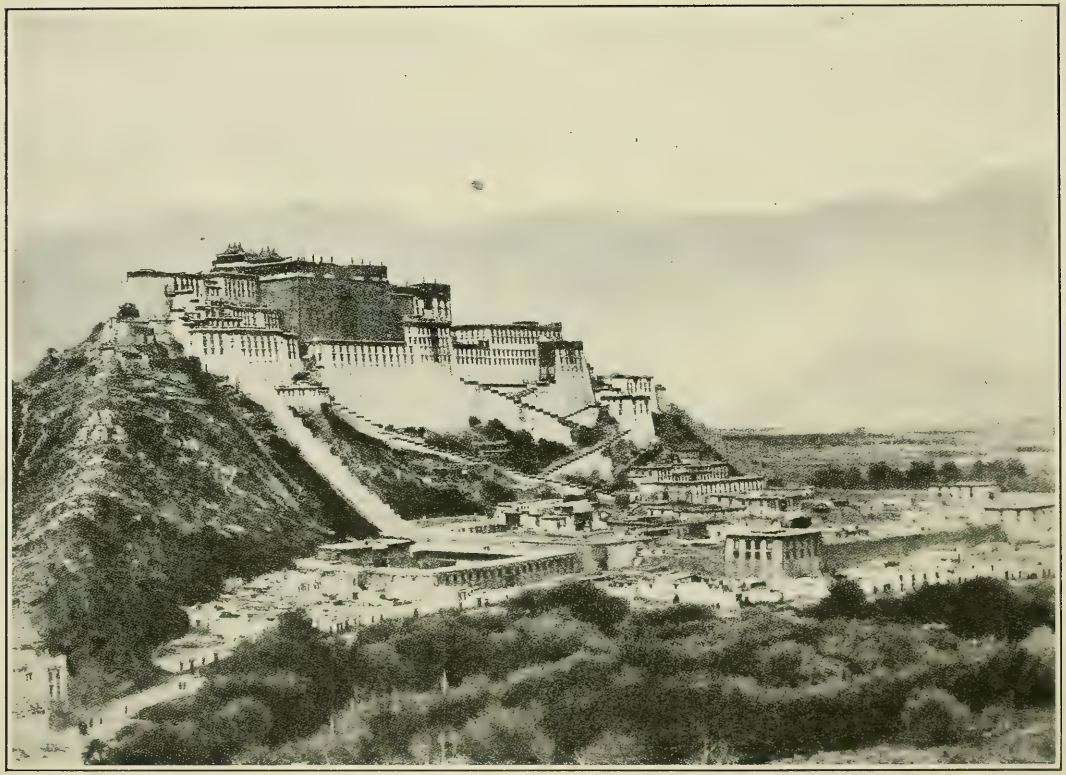
NOTES ON TIBET

AT a recent meeting of the Asiatic Society of Japan, Rev. Ekai Kawaguchi, who succeeded in living nearly one year in Lhassa, 1901-1902, gave an address on his "Personal Experiences among the Tibetans," of which the following notes are given:

The architecture of Lhassa is typical of that of all Tibet. The temples are built of stone. Their roofs are flat and covered with a cement-like substance. The general form is castle-like. The houses are mostly constructed of a sort of adobe or sun-dried bricks. They are lighted from above by means of a kind of sky-light without glass. In the better homes the ceiling is covered with a white cloth. They have no floors, natural earth serving instead; but in the corner of the room there is a carpet, where they sleep, sometimes also sit, and whither they always show guests. In material and finish, the houses are rough. Timbers and boards are not planed or polished.

The name of Lhassa signifies "Country of God." Looked at from a distance, it also may give that impression; but a single close view shows that it is a misnomer. It is, in fact, a very dirty place. The streets are narrow and filthy. The shops of the city are of two sorts. One kind is similar to those of Japan—a room with the side open and the wares exposed to view from the outside. The other variety is simply stands or places in the street where the goods are spread out to view. The usual size of a shop is about twelve feet; twenty or twenty-five feet would be very large. In them are sold cloth, butter, tea, flour, Chinese breads, and native products generally; also some foreign things (not specified). Some foreign foodstuffs are imported from India, but they are very dear and only the rich can afford to buy them. Restaurants exist, and in them noodles chiefly are sold. Noodles, with a little meat added, would be a Tibetan feast.

Most of the people in Lhassa are, of course, Tibetans; but there are also Nepaulese to the number of four or five hundred, about two hundred Cashmerians, and many Chinese. Tibetans in many respects resemble Japanese, but in some respects they differ from Japanese. In strong contrast with Japanese are their great stature and their filthy habits. Their indifference to dirt may be indicated by saying that a Tibetan's



Potala, the Palace of the Grand Lama, Lhassa

From "Journey to Lhassa and Central Tibet," by Sarat Chandeas Das. Edited by W. W. Rockhill. E. P. Dutton & Co.

ideals of cleanliness are the Chinese. Tibetans represent themselves as being very religious. They pretend to be devout Buddhists. If asked about their purposes or desires in life, they would reply that their one ideal and their one desire is Buddha, or to realize Buddhism. For this they work, live, steal. But this is mostly pretense. Outwardly they appear calm, mild, and simple, but inside they are harsh and cruel.

The rule is polyandry, but polygamy is occasionally met with. For example, if there be a family of five sons, all together take one wife. The eldest is then called "father," and each of the others is called "uncle." On the other hand, if there be a family of three daughters and no sons, all three sisters take one husband.

Among the Tibetans there are four different forms of funeral ceremony. They arise from the Indian proverb that man comes from four elements, viz., earth, water, fire, wind. According to the first ceremony, the bones are crushed, the flesh is cut in pieces, the body cooked and fed to dogs, birds, and eagles. According to the second ceremony, the body is burned, consumed by fire. This is not common, but is sometimes practiced. In the third ceremony, the corpse is thrown into one of the great rivers, after having been decapitated and dismembered. According to the fourth form, the body is buried in the earth. This method is rarely employed, only when the other ceremonies are inconvenient. Music and literature among the Tibetans are at a very low stage. They have but a single musical instrument. It is similar to the *samisen*.

THE BULLOCK-WORKMAN EXPLORATIONS

IN No. 21 of the *Mitteilungen des Deutschen und Oesterreichischen Alpenverein* for 1903 Maj. Max Schlagintweit makes the following statement:

"The glacier region of Chogo Lungma was already explored in the year 1856 by my brother, Adolf Schlagintweit, and volume 1 of the Travels of the Brothers Schlagintweit presents a large view of this glacier. The Americans, Dr and Mrs Bullock Workman, were not, therefore, the first to set foot in that region, since their predecessor in its exploration was a German."

In reply to this statement we would say, we have carefully examined at the Library of the Royal Geographical Society in London the volume referred to and failed to find in it any mention whatever of the Chogo Lungma glacier. Not even the village of Arandu, below the termition of that glacier, is mentioned. Again, neither the Chogo Lungma glacier nor the village of Arandu is noted on the maps accompanying the large atlas of illustrations issued with the work, nor is any view of the Chogo Lungma to be found among the illustrations themselves.

A view is given of a fragment of a glacier called by the Schlagintweits Chorkónda, but this does not resemble the scenery at any point of the Chogo Lungma, and the position assigned in latitude and longitude to the Chorkónda places it a considerable distance southeast of the Chogo Lungma.

The nearest point to the Chogo Lungma visited by Adolf Schlagintweit appears to have been Chutrun, at the entrance of the Basha Valley, more than two marches below Arandu.

In 1862 Col. Godwin Austen, while surveying in this region, ascended the valley in which the Chogo Lungma lies some 12 miles. So far as we have been able to learn, there is no record of any one having visited or explored the upper 18 miles of this glacier or its terminal branches previous to our explorations in 1902 and 1903.

FANNY BULLOCK WORKMAN.
WILLIAM HUNTER WORKMAN.

A NEW HARBOR IN PORTO RICO

ANOTHER good harbor in Porto Rico has been added to those which the labors of the U. S. Coast and Geodetic Survey have introduced to the world at large. Although every harbor in Porto Rico has doubtless long been known to fishermen and local traders, the cartographers knew nothing about Ensenada Honda, Jobos, or Guyanilla until the detailed hydrographic surveys of the Coast Survey were published.

To the list above given may now be added Boqueron Bay, which has just been surveyed. It lies ten miles to the southward of Mayaguez and four miles north of Cabo Jojo, the southwestern point of Porto Rico.

Boqueron Bay is an indentation on the coast about two miles deep and two miles wide at the mouth. It is protected by a coral reef across the mouth, through which two passages lead into the harbor. Through the northernmost, close under point Guaniquilla, four fathoms can be carried, while the passage just south of the middle of the reef has a depth of six fathoms. Once inside, good holding ground of not less than four fathoms is found over an area of about one and one-half square miles. The water shoals towards the head of the bay where the small town of Boqueron is situated. This forms the commercial outlet for the valley of the Borinquen River and of the region as far back as the town of Lajas. This tributary region produces considerable quantities of sugar, molasses, and cocoanuts.

J. C. LANDERS.

Coast and Geodetic Survey.

GEOGRAPHIC LITERATURE

The Romance of the Colorado River. By Frederick S. Dellenbaugh. With maps and illustrations. Pp. 800. New York: G. P. Putnam's Sons.

This work is an account of the exploration of this wonderful river from the time of Alarcon, Melchior Diaz, and the friars of the early Spanish days up through the explorations of early hunters and trappers, the army explorations, and finally the two expeditions of Powell. It is not generally known that Powell made two descents of the Colorado—the first, the narrative of which is well known, in 1869, and a second in the years 1871 and 1872. The story of this second trip through the series of wonderful cañons is here told for the first time and by a member of the expedition. Powell's second expedition through the cañons of the Green and Colorado necessarily followed the same route as his first, but the passage down the river was slow and was interrupted by many side trips, for the study of the geology and physiography of this wonderfully interesting region; so while the first expedition took but a little over three months, in the second passage of the cañons, which ended at the mouth of Kanab Creek, some sixteen months were expended, mainly in exploration of the surrounding regions. The story is fascinating and well told, for the author is an artist with the pen as with the brush. The book is beautifully printed on heavy paper and is amply and fitly illustrated. H. G.

Floods of the Spring of 1903 in the Mississippi Watershed. By H. C. Frankenfield. Profusely illustrated. Pp. 63. 12 x 14 inches. Washington: U. S. Weather Bureau. 1904.

Mr Frankenfield gives a permanent and interesting record of the unprecedentedly high floods of 1903 in the Mississippi watershed, and of the work of the U. S. Weather Bureau in connection with the floods. The high water

at New Orleans in April was forecast by the Weather Bureau four weeks in advance, which gave ample time to construct additional levees in the city and saved millions of dollars of property, according to the estimate of the New Orleans Cotton Exchange. The floods of May and June in the middle Mississippi and lower Missouri valleys were the most disastrous in our history. The ruin and desolation were beyond description. At least 100 lives were lost and $40,000,000 value of crops and industries swept away. Mr Frankenfield publishes a number of illustrations showing the raging torrents and flooded cities; also maps of the drainage basin of the Mississippi River and of the overflowed areas and levee systems, and charts showing the precipitation which caused the floods.

Geographen-Kalendar. 1904–1905. By Hermann Haack. Pp. 290. 4½ x 6½ inches. With 16 maps. Gotha: Justus Perthes. 1904.

This useful annual volume contains—

(1) A series of tables of areas, lengths of degrees of the parallel and meridian, etc.

(2) Brief summaries of the geographical events of 1903, with maps.

(3) Explorations in 1903.

(4) Geographical literature in 1903.

(5) Obituaries of geographers who died in 1903.

(6) Directory of geographical organizations and bureaus of the world.

The Alaskan Boundary. By George Davidson. Royal octavo, pp. 235, with maps. Published by the Alaska Packers' Association, San Francisco, 1903.

This is a complete history of the boundary between Alaska and Canada from the earliest days down to and including the award of the Joint Commission. It contains copies of treaties, conventions, and other state papers relating to that boundary. It is probable that nothing could show more conclusively the childish absurdity of the claims of Canada than this cold, dispassionate statement of facts. H. G.

Notes on Panama is the subject of a bulletin of 300 pages, compiled by Capt. G. E. Hale and published by the War Department. The report contains a large map of the republic.

ARTICLES FROM JUNE MAGAZINES

Two Pacifics, Harold Bolce. Booklovers' Magazine.

Orange Culture in California, Allen Sutherland. Do.

Fisherfolk of Newfoundland, P. T. McGrath. Outing.

Physiographic Control; Chattanooga Campaigns of the Civil War, Frederick V. Emerson. Popular Science Monthly.

Immigration, Dr Allan McLaughlin. Do.

Daughters of the Nile, Broughton Brandenburg Pearson's.

Marvelous Development Lower California. Modern Mexico.

Morocco and Anglo-French Agreement, Walter B. Harris. The Independent.

The Modern Steerage, Winthrop Packard. The World To-day.

National Bureau of Standards, Leroy T. Vernon. Do.

A Land where Banana is King, Francis Trevelyan Miller. Do.

De l'Atlantique au Tchad par la Benoue Lenfant, La Geographie, Paris.

Volcanic Origin of Oil, Eugene Coste. Journal of the Franklin Institute.

Government Irrigation Work, Guy E. Mitchell. Scientific American.

West African Negroland, Lady Lugard. Journal Royal Colonial Institute.

Projected New Barge Canal, Thomas W. Symons Bulletin American Geographic Society.

First Impressions of Japan, George Kennan. Outlook.

The Mountains, Steward Edward White. Do.

Riviera of Russia, Victor Dingelstedt. Scottish Geographical Magazine.

From the Atlantic to Chad by Niger and Benue, Captain Lenfant. Do.

Turkestan and Corner of Thibet, Oscar T. Crosby. Geographical Journal.

Desiccation of Eur-Asia, Prince Kropotkin. Do.

National Antarctic Expedition, Captain Colbeck. Do

The Waldseemuller Facsimiles, Edward Heawood, M. A. Do.

GENERAL ANNOUNCEMENT

EIGHTH INTERNATIONAL GEOGRAPHIC CONGRESS, WASHINGTON, 1904

THE attention of the members of the National Geographic Society and all persons interested in the science of geography is invited to the following General Announcement of the Committee of Arrangements of the Eighth International Geographic Congress. Those intending to become members of the Congress should address the Secretary of the Committee of Arrangements, J. H. McCormick, Hubbard Memorial Hall, Washington, D. C.

HUBBARD MEMORIAL HALL,

WASHINGTON, D. C., U. S. A., *June, 1904.*

The Executive Committee of the Seventh International Geographic Congress, held in Berlin in 1899, having voted to convoke the Eighth Congress in Washington, a Committee of Arrangements was, at the instance of the National Geographic Society, organized on behalf of several geographic societies and clubs, viz :

National Geographic Society.
American Geographical Society.
Geographical Society of Philadelphia.
Geographic Society of Chicago.
Geographical Society of Baltimore.
Geographical Society of the Pacific.
Geographical Society of California.
Peary Arctic Club.
Appalachian Mountain Club.
American Alpine Club.
Mazamas.
Sierra Club.
Harvard Travelers' Club.

After issuing a brief announcement through the scientific press late in 1903, this Committee of Arrangements, in January, 1904, circulated a preliminary announcement inviting geographic societies and cognate institutions and all persons interested in any phase of geographic science to participate in the first international congress to be held in the western hemisphere in September of this year. Gratifying replies have been received; several hundred individuals and institutions have already registered as members of the Congress ; a number of delegates have been appointed to represent geographic societies in different parts of the world; notice of the appointment of a number of governmental representatives has been received, while titles of nearly 200 papers have been submitted for presentation before the Congress.

The plans of the Committee of Arrangements and other committees are now sufficiently advanced to warrant the issue of this general announcement and to extend a cordial and specific invitation to all persons interested in the science of geography to become members of the Congress and participate in its proceedings.

TIMES AND PLACES OF CONVENING

After assembling informally in Washington on the evening of September 7, 1904, the Congress will formally convene on Thursday, September 8, at 10 o'clock. It will reconvene in Philadelphia on Monday, September 12, at 9 o'clock ; and again in New York on Tuesday, September 13, at 10 o'clock. After a field meeting at Niagara Falls on Friday, September 16, it will reassemble in Chicago on Saturday, Sep-

tember 17, at 10 o'clock; and it will finally convene in St Louis, in conjunction with the International Congress of Science and Arts, on Monday, September 19, at 10 o'clock.

For convenience the meetings will be classified as (1) General Sessions, usually held in the forenoon; (2) Sectional Meetings, usually afternoon; (3) Field Meetings; (4) Evening Lectures, and (5) Social Gatherings.

HEADQUARTERS

Until September 7 the office of the Congress will be in Hubbard Memorial Hall (the home of the National Geographic Society), corner 16th and M Streets N. W., Washington, D. C. On Wednesday, September 7, the records will be transferred to the Ebbitt House, 14th and F Streets N. W., and this hotel will remain the headquarters during the stay of the Congress in Washington, and the secretaries will be in constant attendance for registering members, supplying badges, furnishing information, etc.

On September 12 an office for registration will be opened in the headquarters of the Geographical Society of Philadelphia, 1520 Chestnut Street.

On the morning of the 13th an office for registration will be opened in New York, at the American Geographical Society building, 15 West 81st Street, which will be the headquarters of the Congress during its stay in New York.

On September 17 a registration office will be opened in Cobb Hall of the University of Chicago.

On the morning of September 19 a registration office will be located in the Hall of Congresses on the Exposition grounds in St Louis. On Saturday, September 24, the records will be retransferred to Hubbard Memorial Hall, Washington, where the office will be retained and where all correspondence should be directed before the final closing of the affairs of the Eighth International Congress.

REGISTRATION

Delegates, members, and associates, and persons desiring to become members, are requested to register on the earliest possible date at the local headquarters in the city in which they first attend the Congress. Those who participate in the Washington sessions are especially desired promptly to record their names and local addresses, in order to facilitate the preparation of lists of membership and the delivery of mail. Immediately on registering, members of the Congress will receive the official badge entitling them to the privileges of the Congress and to the courtesies extended to members by local committees.

HOTELS

In Washington the hotels recommended are as follows:

The Ebbitt House (headquarters), 14th and F Streets, American plan, $3 and $4 per day.

The New Willard, across street from the Ebbitt House (headquarters), three squares south of meeting place, European plan, $2.50 per day upward.

The Raleigh, 12th Street and Pennsylvania Avenue, European plan, $2 per day upward.

The Arlington, one block west of meeting place, American plan, $5 per day.

The Shoreham, across street from meeting place, European plan, $2 and $3 per day.

The Colonial, across street from meeting place, European plan, $1.50 per day.

Members preferring private or boarding houses to hotels can be accommodated at reasonable rates by communicating in advance with the Secretary of the Committee of Arrangements.

In New York the hotel headquarters will be in the Endicott, corner Columbus Avenue and 81st Street, where the rates (European plan) are from $1 to $3 per day.

In Chicago, Hotel Del Prado, midway

between Chicago University and Field Columbian Museum, will be found convenient; the rates (European plan) are from $1.00 to $2.50 per day. To those preferring downtown hotels, the Auditorium and the Auditorium Annex are recommended (European plan, $2.50 to $5.00 per day).

In St Louis the hotel headquarters will be the Inside Inn; the rates (European plan) are $2.50 per day, and $4.50 American plan. Persons desiring accommodations at this hotel should notify the Committee of Arrangements as soon as possible, in order to insure proper accommodations.

PROGRAM

The following general program for the Congress is proposed by the Committee of Arrangements, subject to revision by the Presidency after the first meeting in Washington:

Wednesday, September 7

Evening: Informal reception at Hubbard Memorial Hall by the National Geographic Society.

Thursday, September 8

Morning, 10 o'clock: Formal opening of the Congress, George Washington (Columbian) University Hall, 15th and H Streets.

Afternoon, 2.30 o'clock: Visits to Scientific Bureaus.

Evening, 8 o'clock: Lecture.

Friday, September 9

Morning, 10 o'clock: General session, devoted especially to governmental surveys.

Afternoon, 2.30 o'clock: Sectional meetings.

5 o'clock: Reception by Mrs Gardiner Greene Hubbard at "Twin Oaks."

Evening, 8 o'clock: Lecture by Prof. Dr Er. von Drygalski.

Saturday, September 10

Morning, 10 o'clock: Sectional meetings.

Afternoon, 2.30 o'clock: Sectional meetings.

Evening, 8 o'clock: Reception by President and Mrs. Peary.

Sunday, September 11

Members so desiring will have the opportunity of spending a few hours on an excursion boat, passing Mount Vernon and other points of geographic interest on the lower Potomac.

At 7 o'clock the Congress will take a Pennsylvania Railway train at the Sixth Street station, arriving in Philadelphia at 10 p. m.

Monday, September 12

Leaving Broad Street station at 9 o'clock, the party will be conveyed, under the guidance of members of the Geographical Society of Philadelphia, to Independence Hall. A brief visit will be made to the rooms of the American Philosophical Society, after which the party will be driven to the Free Museum of Science and Art of the University of Pennsylvania. Following an inspection of the museum, the members of the Congress will be the guests of the University at a luncheon at 1 o'clock at Houston Hall.

Preceding a field meeting in Fairmount Park, brief addresses will be made by local and other geographers. At 2.30 p. m. the foreign delegates and foreign members and associates will enter coaches and be driven through Fairmount Park and along the Wissahickon drive to the Philadelphia Country Club, where a subscription dinner will be tendered all foreign guests at 6 o'clock in the evening. The party will leave Broad Street station, in Pullman cars, for New York later in the evening.

Tuesday, September 13

Morning, 10 o'clock: General session in the lecture hall of the American Geographical Society building, 15 West Eighty-first street, devoted to oceanog-

raphy; introduced by an address from Sir John Murray.

1 o'clock: Buffet lunch at the American Museum of Natural History.

Afternoon, 2.30 o'clock: Sectional meetings in rooms of the American Museum of Natural History.

Evening, 8 o'clock: Public lecture.

9.15 o'clock: Reception tendered by the American Geographical Society.

Wednesday, September 14

Morning, 10 o'clock: Sectional meetings.

1 o'clock: Buffet lunch at the American Museum of Natural History.

Afternoon, 2.30 o'clock: Sectional meetings, devoted especially to commercial geography.

Evening, 8 o'clock: Subscription dinner complimentary to foreign delegates.

Thursday, September 15

At 9 o'clock the party will leave the pier at West One hundred and twenty-ninth street for an excursion up the Hudson River on the steamer *Richmond*. After passing through the lower valley and the highlands, landing will be made at Fishkill. Here trolley and elevator cars will transfer the party to the top of Mt Beacon, from which a splendid view of the Hudson Valley and bordering mountains may be obtained. Professor William Davis will conduct the field meeting on Mt Beacon.

Taking the steamer again about 4 o'clock, the party will proceed down the river to West Point, where landing will be made to visit the U. S. Military Academy. The corps of cadets will be seen in their regular afternoon exercises, closing with a dress parade.

The party will take a ferry from West Point to connect with the special train on the New York Central Railroad at 8 o'clock, while members leaving the party here will take steamer for New York at about 7 o'clock.

Lunch will be served on board the steamer before reaching Fishkill, and dinner will be served for members returning to New York after leaving West Point.

Friday, September 16

The party will arrive at Niagara Falls at 7 o'clock a. m. After an address on the geographic development of the great cataract by Mr G. K. Gilbert, there will be a general field meeting, in charge of geographers familiar with the region. The party will descend the river on the left (Canadian) side of the gorge in trolley cars to Queenstown; thence they will ferry to Lewiston, and ascend the right (American) side of the gorge past the Whirlpool Rapids, resuming the special train at 7.30 o'clock p. m.

Saturday, September 17

Morning, 8 o'clock: Arrive at Twelfth Street station, Chicago.

10 o'clock: General session at Cobb Hall.

1 o'clock: Buffet lunch at Hutchinson Hall.

Afternoon, 2.30 o'clock: Visits to various buildings of Chicago University, to Field Columbian Museum, to the Museum of Fine Arts, and to the Chicago Public Library.

Evening, 8 o'clock: Reception tendered by the Geographical Society of Chicago, at Historical Society Building.

Sunday, September 18

If desired by any considerable number of members, an opportunity will be afforded for a view of the Chicago lake front from an excursion steamer.

At 10 o'clock p. m. the party will take a special train on the Illinois Central Railway at Twelfth Street station (Twelfth Street and Michigan Boulevard) for St Louis.

Monday, September 19

Morning, 8 o'clock: Arrive at Union station; breakfast at station (Terminal Hotel), afterward taking a Wabash shuttle train to World's Fair Grounds.

10 o'clock · Meeting with the World's Congress of Science and Arts in the Hall of Congresses, Administration Building, World's Fair.

Afternoon: Opportunity for inspection of exhibits of geographic interest (to be listed in a later program).

Tuesday, September 20

Morning, 10 o'clock: Meeting with World's Congress of Science and Arts, in the Department of Sciences of the Earth.

Evening, 8 o'clock: Lecture by the President of the Congress, Commander Robert E. Peary, U. S. N.

Wednesday, September 21

The members of the International Geographic Congress will meet in conjunction with the World's Congress, and will have special opportunities for participating in discussions.

Thursday, September 22

A formal session closing the Eighth International Geographic Congress will occur at an hour and place to be announced in later programs.

TRANSPORTATION

Transportation from Washington to New York by special train over the Pennsylvania Railroad will be $5.

Transportation has been arranged (including sleeping-car berth and meals) from New York to Chicago and St Louis at greatly reduced rates. The cost of this transportation to members, from New York to Niagara Falls, Chicago, and St Louis, the special Pullman train, will be $45. This will include, beside railway fare, sleeping-car service and meals while traveling, and breakfast and transfer to World's Fair at St Louis, and also return railway fare from St Louis to New York, including stop-over privileges in Washington, but not sleeping car and meals from St Louis to New York. Tickets are good for return passage on any regular train on Baltimore and Ohio Railroad out of St Louis.

Definite arrangements have been made for an international excursion, leaving St Louis on the evening of September 24 by a special train which will proceed over the Santa Fé lines to the terminal station and hotel on the brink of the Grand Cañon of the Colorado, *via* Williams, Arizona, and will then run *via* El Paso and the Mexican International Railway to the City of Mexico. Thence the train will return over the Mexican National Railway *via* Laredo to St Louis. The cost of this international excursion, including sleeping-car privileges and meals, will be approximately $150; time required will be 12 to 14 days.

Members desiring hotel or transportation accommodations, also those wishing to participate in the excursion, should notify the Committee of Arrangements as soon as possible in order that proper facilities may be accorded them.

Books, maps, and instruments intended for use in the Congress, also cameras, are admitted free of duty. The owner, however, must make a declaration to that effect before the customs officers at the port of entry.

MEMBERSHIP

Membership in the Congress may be acquired by members of geographic and cognate societies on payment of $5 (25 francs, 1 pound, or 20 marks); persons not members of such societies may acquire membership by a similar payment and election by the Presidency. Members will be entitled to participate in all sessions and excursions of the Congress and to attend all lectures and social meetings in honor of the Congress; they will also (whether in attendance or not) receive the publications of the Congress, including the daily program and the final *Compte Rendu*.

Ladies and minors accompanying members may be registered as associates on payment of $2.50 (12½ francs, 10 shillings, or 10 marks); they shall enjoy all privileges of members except the rights of voting and receiving publications.

Teachers in public schools may also be registered as associates after nomination by two members and subject to the action of the Presidency, on payment of $2.50; they shall enjoy all privileges of members except the rights of voting and receiving publications.

Pending the opening of the Congress, subscriptions will be received by the Committee of Arrangements, and members and associates tickets will be either mailed to subscribers or held for delivery on registration; during and after September 8 subscriptions will be received and tickets will be issued at the official headquarters under the direction of the Presidency.

Geographers and their friends desirous of attending the Congress or receiving its publications are particularly requested to signify their intention at the earliest practicable date, in order that ticket certificates as members or associates may reach them safely; the privileges of the Congress, including the excursions and social gatherings, can be extended only to holders of tickets.

SOCIETIES AND DELEGATES

It is hoped that the Eighth International Geographic Congress may be an assemblage of geographic and cognate institutions no less than of individual geographers; and to this end a special invitation has been extended to such organizations to participate in the Congress through delegates on the basis of one for each one hundred members up to a maximum of ten. No charge will be made for the registration of institutions, though the delegates will be expected to subscribe as members; and in order that the list of affiliated institutions may be worthy of full confidence, the Committee of Arrangements reserve the right to withhold the name of any institution pending nomination by the Presidency. The publications of the Congress will be sent free to all institutions registered. In order that the geographic societies of the Western Hemisphere may fully utilize the opportunity afforded by this Congress for establishing closer relations with those of the old world, Spanish will be recognized as one of the languages of the Congress, together with French, English, German, and Italian, in accordance with previous usage; a communication before the Congress may be written in one (or more) of these languages.

Scientific societies not strictly geographic in character, public libraries, universities, academies of science, and cognate institutions are invited to subscribe to the Congress on the basis of membership; they will then receive certificates, their names will appear in the published lists of members, and they will receive all publications of the Congress (including daily programs and the *Compte Rendu* as issued).

COMMUNICATIONS

The subjects for treatment and discussion in the Congress have been classified as follows:

1. Physical geography, including geomorphology, meteorology, hydrology, etc.
2. Mathematical geography, including geodesy and geophysics.
3. Biogeography, including botany and zoölogy in their geographic aspects.
4. Anthropogeography, including ethnology.
5. Descriptive geography, including explorations and surveys.
6. Geographic technology, including cartography, bibliography, etc.
7. Commercial and industrial geography.

8. History and geography.
9. Geographic education.

A special opportunity will be afforded for the discussion of methods for surveying and map-making and for comparison of these methods as pursued in other countries with the work of federal and state surveys maintained in this country.

Delegates and members desiring to present communications before the Congress or wishing to propose subjects for discussion are requested to signify their wishes at the earliest practicable date. A list of titles of communications already offered is appended. It is especially needful that any titles offered hereafter shall be accompanied by abstracts (not exceeding 300 words in length) in order that the Presidency may take prompt action toward introducing the titles and abstracts in the general program to be published at the beginning of the Congress.

The time required for presenting communications should be stated; otherwise twelve minutes will be allotted. It is anticipated that not more than twenty minutes can be allotted for any communication unless the Presidency decide to extend the time by reason of the general interest or importance of the subject.

Titles and abstracts of communications may be submitted either through the Committee of Arrangements or directly to the Chairman of the Committee on Scientific Program. Pending the opening of the Congress, this committee shall decide whether the same are appropriate for incorporation in the program, though the decisions of the committee shall be subject to revision by the Presidency after the Congress convenes.

The preliminary announcement, issued in January last, having provided that proposals affecting the organization of the Congress should be submitted in writing before May 1, any such proposals hereafter received will be laid before the Presidency, who will determine whether they shall receive consideration at the Eighth Congress or be laid over for future action.

PROGRAMS

The General Program, comprising titles and abstracts of communications, sectional assignments, announcements of general, sectional, and social meetings, etc., will be published on or about September 7. All titles, abstracts, etc., designed for incorporation in this program must be in the hands of the Committee of Arrangements not later than August 1, 1904.

Daily programs will be issued during the meetings in Washington and New York. Any matter designed for incorporation in these must be in the hands of the secretaries by six o'clock of the day preceding issue.

COMPTE RENDU

The Presidency, with the aid of a Committee on Publication, will prepare a volume of proceedings or *Compte Rendu*, comprising those communications and abstracts which they deem it needful to publish; and this publication will be sent to all members of the Congress, including societies represented by delegates.

All communications and abstracts submitted for reading or printing shall be deemed the property of the Congress, and in every respect subject to the action of the Presidency, although a request for the return of any copy not approved for publication might be entertained at the option of the Presidency.

Authors of communications exceeding seven (printed) pages in length desiring separates shall order the same (specifying the number) in writing on their manuscript. Such separates will be furnished at cost of press work, paper, and cover, plus a small percentage (not exceeding twenty-five).

EXHIBITS

No exhibits will be arranged directly by the Congress. Opportunities for inspecting actual geographic work—*e. g.*, map-making, etc.—will be afforded especially in Washington in the offices and laboratories of the U. S. Geological Survey, the U. S. Coast and Geodetic Survey, and the U. S. Weather Bureau.

Opportunities will also be afforded for inspecting the exhibits of geographic character at the Louisiana Purchase Exposition in St Louis.

Publishers and other parties may make appropriate exhibits in connection with the Congress on approval of the Committee of Arrangements or the Presidency.

CORRESPONDENCE

Correspondence relating to the Congress before, during, and after the sessions herein announced, and all remittances, should be directed to

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TITLES OF PAPERS OFFERED TO JUNE 1, 1904

(ARRANGED BY TOPICS)

NOTE.—Authors of papers will kindly examine the titles announced in this preliminary program. If they are not satisfactory in any way, kindly notify the Secretary of the Committee on Scientific Program at the earliest possible moment.

All letters upon this subject should be addressed as follows:

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1. PHYSIOGRAPHY OF THE LAND

1. Physiography of the Archean Areas of Canada
   Prof. A. W. G. Wilson, Montreal, Canada.
2. Gorges and Waterfalls of Central New York.
   Prof. R. S. Tarr, Ithaca, N. Y.
3. Physical History of Cape Cod.
   Prof. W. H. Niles, Boston, Mass.
4. Sur la Relief des Karpates meridionales.
   Prof. Emmanuel de Martonne, Rennes, France.
5. Geography of Mt Shasta and the Yosemite.
   Mark B. Kerr, C. E., Stent, Cal.
6. Physiographical Sketch of the Adirondack Region.
   Prof. J. F. Kemp, New York City.
7. Island Tying.
   F. P. Gulliver, Ph. D., Southboro, Mass.
8. The Complications of the Geographical Cycle.
   Prof. W. M. Davis, Cambridge, Mass.
9. The Bearing of Physiography on Suess' Theories.
   Prof. W. M. Davis, Cambridge, Mass.
10. Some Geologic Data in the Geography of the Mississippi River.
    Prof. C. W. Hall, Minneapolis, Minn.
11. Deflection of Michigan Rivers by Terrestrial Rotation.
    Prof. M. S. A. Jefferson, Ypsilanti, Mich.
12. Scientific Exploration of Caves.
    Prof. E. A. Martel (absent), Paris, France.
13. (Title later.)
    Prof. A. Penck, Vienna, Austria.
14. Classification of Mountains.
    Prof. W. N. Rice, Middletown, Ct.
15. Glacial Erosion in the Finger Lake Region of New York.
    M. R. Campbell, Washington, D. C.
16. The Sculpture of Massive Rocks.
    G. K. Gilbert, Washington, D. C.

2. METEOROLOGY

1. The Climate of Guam as Revealed by Meteorologic Observations on the Island during the Year 1902.
   Cleveland Abbe, Jr., Ph. D., Washington, D. C.
2. A Climatological Dictionary for the United States.
   Prof. A. J. Henry, Washington, D. C.
3. The Scientific Work of the Mount Weather Meteorological Research Observatory.
   Prof. F. H. Bigelow, Washington, D.C.
4. Suggestions Concerning a More Rational Treatment of Climatology.
   Prof. R. DeC. Ward, Cambridge, Mass.
5. The Climate of Canada.
   Prof. R. F. Stupart, Ottawa, Canada.
6. The Climate of Kimberley.
   J. R. Sutton (absent), Kimberley, South Africa.
7. Non-periodic Variations of the Atmospheric Circulation in the Region of the North Atlantic Ocean.
   Dr W. Meinardus, Berlin, Germany.
8. The Principles of Graphical Climatology.
   Dr K. Kassner, Prussian Meteorological Institute.
9. Antarctic Meteorology and International Coöperation in Polar Work.
   Henryk Arctowski, Brussels, Belgium.

3. OCEANOGRAPHY

1. Currents and Climatology of the North Pacific.
   Prof. G. Davidson, San Francisco, Cal.
2. Co-tidal Lines for the World.
   Prof R. A. Harris, Washington, D. C.
3. European Polar Sea Investigations.
   Prof. Knipowitsch,
   St Petersburg, Russia.
4. Deep Sea Deposits.
   Sir John Murray,
   Edinburgh, Scotland.
5. New Theory of Tidal Undulations in Oceanography.
   O. T. Olsen, Grimsby, England.
6. Border Seas of Japan.
   Prof. J. J. Rein, Bonn, Germany.
7. Physical Character and History of the Baltic.
   Prof. J. J. Rein, Bonn, Germany.
8. Evidence of Land Near the North Pole.
   Prof R. A. Harris, Washington, D. C.
9. Fifty Years in Oceanography.
   Prof. A. Lindenkohl,
   Washington, D. C.
10. Strömungen der huft und des Wassers.
    Prof. E Witte, Brieg, Germany.
11. Temperature Charts of the Azores.
    Prof. J. Thoulet, Nancy, France.
12. La Methode Graphique en oceanographie.
    Prof. J. Thoulet, Nancy, France.
13. Les travaux oceanographiques du labora toire de Nancy.
    Professor Thoulet, Nancy, France.
14. Oceanographic Instruments.
    Lord Kelvin (absent),
    Glasgow, Scotland.
15. Canadian Tidal Observations.
    Prof. W. B. Dawson (absent),
    Ottawa, Canada.

4. VOLCANOES

1. Hawaiian Geography.
   Prof. C. H. Hitchcock, Hanover, N. H.
2. The Destruction of Pompeii as Interpreted by the Volcanic Eruptions of Martinique.
   Prof. A. Heilprin, Philadelphia, Pa.
3. The Tower of Mt Pelée.
   Prof. A. Heilprin, Philadelphia, Pa.
4. The Volcanoes of Martinique, Guadeloupe, and Saba.
   Dr E. O. Hovey, New York City.
5. The Volcanoes of St Vincent, St Kitts, and St Eustatius.
   Dr E. O. Hovey, New York City.
6. Sur les characteres speciaux de la repartition de la Mediterranie.
   Paul Vidal de la Blache, Paris, France.

5. EARTHQUAKES

1. Relations de la figure du globe avec la distribution des volcans et tremblements de terre.
   Prof. G. Lallemand (absent),
   Paris, France.
2. The Seismical Distribution and Tectonic Connections of Earthquakes in the United States of North America.
   Count de Montessus de Ballore
   (absent), Abbeville, France.
3. Ergebnisse der modernen erdbebenforschung.
   Prof. E. Rudolph (doubtful),
   Strassburg, Germany.
4. Submarine erdbeben und eruptionen.
   Prof. E. Rudolph (doubtful),
   Strassburg, Germany.
5. Vertikale bodenbewegungen beobachtet mit dem trifilargravimeter.
   Prof. A. Schmidt, Stuttgart, Germany.
6. The Energy of Large Earthquakes in Absolute Measure.
   Prof. de Kovesligethy,
   Budapest, Hungary.
7. A New Geometrical Theory of Earthquakes and the Absorption of Earthquakes' Energy by the Earth.
   Prof. de Kovesligethy,
   Budapest, Hungary.
8. Die Internationale Seismologische Staaten Association.
   Dr G. Gerland, Strassburg, Germany.
9. Uber die moderne Seismologie.
   Dr G. Gerland, Strassburg, Germany.

6. GLACIERS

1. Glaciers of British Columbia.
   G. Vaux, Jr., Philadelphia, Pa.
2. The Lewis Range of Northern Montana and its Glaciers.
   F. E. Matthes, Washington, D. C.
3. The Jostedalbræ in Norway.
   Prof. M. Ebeling (absent),
   Berlin, Germany.
4. Glacial Lakes and Pleistocene Changes in the St Lawrence Valley.
   Prof. A. P. Coleman, Toronto, Canada.
5. Studies of the Snow Region of the High Mountains of Northern Sweden.
   Dr Axel Hamberg,
   Stockholm, Sweden.
6. The Reservoir Lag in Glacier Variations.
   Prof. H. F. Reid, Baltimore, Md.
7. The Glaciers of Mt Hood and Mt Adams.
   Prof. H. F. Reid, Baltimore, Md.
8. Chatter-marks or Crescentic Sub-Glacial Fractures.
   Prof. G. K. Gilbert, Washington, D. C.
9. The Antarctic Glaciers.
   Henryk Arctowski, Brussels, Belgium.

7. MAGNETICS

1. The Magnetic Disturbances During the Eruption of Mt Pelée on May 8, 1902.
   Prof. L. A. Bauer, Washington, D. C.
2. Our Knowledge of the Distribution of the Earth's Magnetism Over the Ocean Areas.
   Prof. L. A. Bauer, Washington, D. C.
3. Magnetic Work of the Navy Department.
   Prof. G. W. Littlehales, Washington, D. C.

II. MATHEMATICAL GEOGRAPHY

GEODESY

1. Recent Practice in the Coast and Geodetic Survey in Triangulation, Base Measurements, and Levelling.
   Prof. J. F. Hayford, Washington, D. C.
2. The Form of the Geoid as Determined by Measures in the United States.
   Prof. J. F. Hayford, Washington, D. C.
3. Photographic Methods Employed by the Canadian Survey.
   Arthur G. Wheeler, Calgary, Canada.
4. Recent Development in the Determination of Geographical Positions.
   Dr Adolf Marcuse, Gr. Lichterfelde, Germany.

III. BIOGEOGRAPHY

1. BOTANICAL

1. The Remarkable Colony of Northern Plants along the Apalachicola River, Florida, and its Significance.
   H. Cowles.
2. The Importance of the Physiographic Standpoint in Plant Geography.
   H. Cowles.
3. La Cartographie de Geographie Botanique.
   C. Flahault, Montpellier, France.
4. Method of Determining the Age of the Different Floristic Elements in the Eastern United States.
   Prof. J. W. Harshberger, Philadelphia, Pa.
5. Mitteilungen uber den fortschritt der pflanzengeographischen Kartographie und die sich daran anschliessende nomenclatur pflanzengeographischer formationen.
   Dr Oskar Drude, Dresden, Germany.
6. Zur Dynamik der Sinlsstoffe.
   T. Christen, Bern Switzerland.

2. ZOÖLOGICAL

1. Origin of Fresh-water Faunas.
   Dr T. Gill, Washington, D. C.
2. World-wide Distribution of Deep Sea Faunas.
   Dr A. E. Ortmann, Pittsburg, Pa.
3. Repartition geographique des Animaux.
   G. Grandidier, Paris, France.
4. (Title later.)
   H. A. Pilsbry, Philadelphia, Pa.
5. The Dispersal Centers of North American Fauna.
   Charles C. Adams, Ann Harbor, Mich.
6. Zoölogical Evidence of the Former Connection of South America and Africa.
   Prof. A. S. Packard, Providence, R. I.
7. The Establishment of game refuges in the United States Forest Reserves.
   A. Sampson, Haverford, Pa.

IV. ANTHROPOGEOGRAPHY.

1. Pigmy Tribes of Africa and Their Distribution.
   S. P. Verner.
2. The Ainu, Aborigines of Japan.
   Prof. F. Starr, Chicago, Ill.
3. Entstehungsbedingungen des menschen.
   L. Chalikiopoulos, Brighton, England.
4. Race Types and Peoples Assembled at the Louisiana Purchase Exposition.
   Prof. W J McGee, Washington, D. C.
5. Correlation Between Ethnic Types and Environment.
   Prof. W J McGee, Washington, D. C.
6. Emphasis on Anthropogeography in the School.
   Miss E. C. Semple, Louisville, Ky.

V. EXPLORATION

1. AFRICA

1. Physical Characteristics of the Kasai Valley, Africa.
   S P. Verner.
2. Africa between the River Jub and the Nile.
   A. Donaldson Smith, Philadelphia, Pa.
3. Results of the Mission to the Mobangi Shari
   A. Chevalier, Paris, France.
4. Madagascar before the French Occupation and Today.
   G. Grandidier, Paris, France.
5. Recent Researches by the French in the Sahara, and Methods of Desert Travel They Have Introduced.
   C. Rabot, Paris, France.

2. ARCTIC REGIONS

1. Desirability of Further Investigations on the Northwest Passage.
   A. J. Stone, New York City.
2. Verlauf und Ergebnisse der Deutschen Sudpolar Expedition.
   Prof. E. von Drygalski, Berlin, Germany.

3. The Antarctic.
Dr H. R. Mill, London, England.
4. The Physical Geography of the Antarctic.
Prof. N. C. G. Nordenskjold, Stockholm, Sweden.
5. The First American Arctic Expedition.
H. G. Bryant, Philadelphia, Pa.
6. A Comparative View of the Arctic and Antarctic.
Dr F. A. Cook, Brooklyn, N. Y.
7. Cruise of the *Belgica* (possibly).
Dr F. A. Cook, Brooklyn, N. Y.

3. ASIATIC

1. Besults of the Philippine Census.
Henry Gannett, Washington, D. C.
2. Ergebnisse einer Forschungsreise den centralen Tein-schan und Dsungarischen Ala-tau, in Jahre 1902.
Dr M. Friederichsen, Gottingen, Germany.
3. Geographical Progress in the Dutch East Indies.
Prof. C. M. Kan, Amsterdam, Holland.
4. First Exploration of the Hoh Lumba Glaciers and Sorbon. Two Record Ascents in the Himalayas.
Mrs Fanny Bullock Workman, Worcester, Mass.
5. The Moraine of the Great Chogo Lungma Glacier, Baltistan Northwest Himalayas.
Dr William Hunter Workman, Worcester, Mass.
6. The Scientific Results of the Russian Expedition to Kham.
Capt. P. K Kozloff (absent), St Petersburg, Russia.
7. Turkestan and Tibet.
Oscar T. Crosby, Washington, D. C.

4. AMERICA

1. The Geographical Work of the Geological Survey of New Jersey
Prof. H. B. Kummel, Trenton, N. J.
2. First Ascents and Altitude Determination in the Canadian Alps.
Prof. H. A. Parker, New York City.
3. Results of a Journey Around Mt McKinley.
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5. Recent Explorations in British America.
Dr R. Bell, Ottawa, Canada.
6. Grundzuge des Geologischer Aufbaus von Mittelamerika.
Dr K. Sapper (absent), Wurtemberg, Germany.
7. The Physical and Economic Geography of Mexico.
Robert T. Hill, Washington, D. C.
8. A Crossing of South America by the Route of Pizarro and Orellana.
Dr A. Hamilton Rice, Boston, Mass.

5. GENERAL

1. Contributions to Geographical Science by the Carnegie Institute of Washington.
President D. C. Gilman, Washington, D. C.
2. Present Status of Discovery and Future Problems of Geographical Exploration in South America.
Dr Wilhelm Sievers, Giesen, Germany.

VI. TECHNIQUE

1. Mother Maps of the United States.
Henry Gannett, Washington, D. C.
2. Application du systeme decimal à la mesure des Angles.
J. de Ray Pailhade, Toulouse, France.
3. Berichterstattung uber die Internationale Abkurzung von Titeln Geographischer Zeitschriften.
O. Baschin, Berlin, Germany.
4. Modern Hydrographical Methods.
Prof. M. Knudsen (absent), Copenhagen, Denmark.
5. Principles of Geographic Relief.
George C. Curtis, Boston, Mass.
6. Hydrologic Works of the Geological Survey in the Eastern United States.
Myron L. Fuller, Washington, D. C.
7. The Chronometer and Time Service of the U. S. Naval Observatory and the Present Status of Standard Time.
Lt. Comdr. Edward Everett Hayden, Washington, D. C.

VII. ECONOMIC

1. The Relations of Commerce to Geography.
O. P. Austin, Washington, D. C.
2. La Valeur economique de la Suisse.
A. de Claparede, Geneva, Switzerland.
3. La Geographie economique et sociale au XX Siecle.
A. de Claparede, Geneva, Switzerland.
4. Geographical Development of the Internal Commerce of the United States.
Dr J. F. Crowell, Washington, D. C.
5. Die entwickelung der Deutschen Kolonien in Brasilien.
Dr A Funke, Berlin, Germany.
6. La Development de la Geographie economique depuis trente aus; magnifiques resultats obtenus et a obtenir encore.
C. Gauthiot, Paris, France.
7. The Extent and Efficiency of Governmental Promotion of Commerce in the Leading Countries.
Prof. E. R. Johnson, Philadelphia, Pa.

8. Rise and Development of the German Colonial Possessions.
   Graf Joachim v. Pfeil u Klein Ellguth, Lauban, Germany.
9. The Economic Importance of the Plateaus in Tropical America.
   Prof. J. R. Smith, Philadelphia, Pa.
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    Sir W. Willcocks, Cairo, Egypt.
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    W. P. Wilson, Sc. D., Philadelphia, Pa.
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    Dr H. C. Taylor, Madison, Wis.
13. The Atlantic Ferry.
    Capt. B. J. Kennelly, London, England.
14. Colonial Development in British Tropical Africa.
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15. Oceanic Fishing Grounds.
    Capt. R. Dittmer, Hannover, Germany.
16. The Division of the Industrial Forces in France by Departments.
    Prof. E. Levasseur, Paris, France.
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    Francis C. Nicholas, New York City.
18. Game and Fur Bearing Animals and Their Influence on the Indian of the Northwest.
    Dr T. W. Thorndike, Boston, Mass.
19. La vateur commerciale et industrielle du Sahara français.
    Prof. E. T. Gautier, Algiers.
20. L'error economique de l'amerique, jugè du vieux continent.
    Georges Blondel, Paris, France.

VIII. HISTORICAL

1. Ancient Oceanography.
   Prof. Guido Cora, Rome, Italy.
2. History and Economic Development of Saint Anthonys Falls.
   Prof. C. W. Hall, Minneapolis, Minn.
3. The Cabot Landfall.
   G. R. F. Prowse, Philadelphia, Pa.
4. North American as Known in 1804 and 1904.
   Gilbert H. Grosvenor, Washington, D. C.
5. Ancient Italian Maritime Itineraries.
   Prof. F. P. Garofalo, Naples, Italy.
6. Some Early Geographers of the United States.
   Rear Admiral C M. Chester, Washington, D. C.
7. (Title later.)
   Prof. E. L. Stevenson, New Brunswick, N. J.
8. Des Chretiens de Saint Mathieu existant en Afrique au commencement du 14me Siecle et de l'identification a l'Ouganda de l'empire Chretien de Magdasor.
   Frederic Romanet du Gaillaud, Haute, Vienne, France.

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1. College Entrance Examinations in Geography.
   Prof. W. M. Davis, Cambridge, Mass.
2. Geographical Excursions for Children.
   Miss Zonia Baber, Chicago, Ill.
3. Geography and History in the United States.
   Prof. A. P. Brigham, Hamilton, N. Y.
4. Observational Work for Children.
   F. Carney, Ithaca, N. Y.
5. Geography in the Normal Schools of the United States.
   Prof. C R. Dryer, Terre Haute, Ind.
6. Die Bestrebungen der Culturnationen sur Hebung des Geographischen Schulunterrichts und ihre Beforderung durch internationalen Nachrichten Austausch.
   H. Fischer, Berlin, Germany.
7. School Geography in the United States.
   Dr Martha K. Genthe, Hartford, Ct.
8. Mathematical Geography for Teachers.
   Prof. J. P. Goode, Chicago, Ill.
9. Economic Geography in Secondary Schools.
   Prof. C. A. Herrick, Philadelphia, Pa.
10. Geographic Influence: A Field for Investigation.
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    W. H. Snyder, Worcester, Mass.
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    R. H. Whitbeck, Trenton, N. J.
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    H. W. Fairbanks (absent), Berkeley, Cal.
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THE NATIONAL GEOGRAPHIC MAGAZINE

PERU—ITS RESOURCES, DEVELOPMENT, AND FUTURE*

BY ALFREDO ALVAREZ CALDERON, OF THE PERUVIAN LEGATION

PERU is about three and one-third times as large as Germany, twice as large as France, nearly three times as large as Texas, and 14 times larger than the State of New York.

The population of this immense territory is about 3,000,000—equivalent to 4.1 inhabitants per square mile. How small this ratio is when compared with some of the European countries may be seen in the following table:

Name of country.	Population per square mile.
Peru	4.1
Sweden	30
Russia in Europe	51
Spain	97
Portugal	151
France	188
Germany	270
Italy	294
Great Britain and Ireland	346
Netherlands	416
Belgium	589

Peru contains a vast sparsely populated territory, greater than that of any European country, Russia excepted, and capable of containing many more millions of inhabitants, who would find a land rich in agicultural and mineral products, and where there is unlimited scope for those who will make their homes there.

The population of the coast might be fairly estimated at 750,000 inhabitants. The white race is the most largely distributed along this zone, and constitutes the main element of progress and wealth in the country. The city of Lima alone contains a large number of foreigners. The bulk of the population, however, resides in the highlands or Sierra, and is composed of 2,000,000 of the native Indian race, descendants of the noble Incas. The climate of this region is the most healthful in the world and is the cause of the strong and healthy constitution of the Cholo or Indian. These are of a light-colored skin, and are mainly employed in the mining exploitations as laborers, and are also proprietors of small tracts of land, which they cultivate independently.

The opinions contained in the following quotations admirably picture the characteristics of the people.

*An address before the National Geographic Society, March, 1904.

The Encyclopædia Britannica describes the Peruvians as "courteous and hospitable."

The author of a description of the voyage round the world by the French vessel *La Junon* says: "Although we were everywhere received with great kindness, nowhere did we meet with so much good will as in Peru."

An English naval officer, writing of the hospitality shown in the south of Peru, says: "Here, if possible, it surpassed that shown us in the north, and this hospitality was from people we had never seen before, and most probably would never see again, and without a chance of ever returning their kindness."

M. Marcel Monnier, the author of "Des Andes Au Para," writing of Peruvian hospitality, says: "May I be permitted at the commencement of this book to address a souvenir to those whose sympathies aided me upon my hazardous journey. They are far away, many of them can never decipher these lines, and I have little chance of seeing them again, but if ever one of these loose sheets should find its way across the sea, I would that it should bear the expression of my gratitude to friends left upon that Peruvian soil whose hospitality was so sweet to me. Everywhere I received it, upon the coast, as in the Sierra, in the rich or in the modest 'hacienda,' at the home of the humble priest, in the 'tienda' of the merchant, in the mud hut of the poor Indian."

Sir Clements Markham says: "The country gentlemen of the Peruvian coast, as a class, are remarkable for their attention to their estates, and for the charity and benevolence they display both to their own dependents and to strangers. The unbounded hospitality, indeed, of all those who made me, an unknown and solitary stranger, often without a letter of introduction, their welcome guest, far exceeded anything I had ever experienced or heard of before."

Peru is situated on the west side of South America, between the parallels of 1½° north latitude and 19° south, and between the meridians of 64½° and 83½° west of Greenwich. It is bounded on the north by the Republic of Ecuador, on the northeast by the Republic of Colombia, and on the east by the United States of Brazil, on the southeast by the Republic of Bolivia, on the south by Chile, and on the west by the Pacific Ocean.

The country is physically divided into three well defined zones—the coast or low land bordering the Pacific, the Sierra or highlands forming the Andean region, and the Montaña or forest region.

The width of the coast lands varies between 62 and 93 miles.

The greatest blessing that nature has bestowed upon Peru is the three ranges of mountains traversing the country from south to north, with an average altitude of 15,000 feet above sea level. They are not only beautiful for their abruptness and majesty, but are the reason of the delightful temperature prevailing on the coast; they provide us with all the climates of the world and products of the world; they contain incalculable mineral wealth and are the sources of all the streams that descending westward irrigate the fertile valleys of the coast, and of the immense net of navigable rivers going eastward that will in the near future constitute the highways through which the numberless products of the forest region will reach the markets of the world. Yet these mountains, by their abruptness and granite formation, by their numerous crevasses and precipices, present enormous difficulties for the building of railroads or ordinary roads.

Owing to their varying altitudes and climatic conditions, the three zones of Peru differ very widely in their charac-

teristics and products, and this constitutes for the country the basis of much of her commerce at home and abroad.

In his work on Peru, Sir Clements Markham says: "This beautiful country, embracing every description and variety of climate and scenery, producing, or capable of producing, in abundance every kind of vegetable that is known in the world, yielding from its mines rich stores of gold, silver, copper, lead, tin, coal, and mercury, and from its herds and flocks an endless supply of hides and fleeces of silky texture, is divided into three very distinct and well defined regions."

(1) "The coast, extending from the foot of the Maritime Cordillera to the ocean, contains numerous successions of rich and fertile valleys, separated from each other by sandy deserts. These valleys enjoy a warm though not oppressive climate. Rain is never known to fall, but refreshing dews descend in abundance during the night. In these fields immense crops of sugar and cotton are raised, while extensive vineyards produce wines of delicious flavor, and a spirit called aguardiente or grape whisky, which is consumed in great quantities by all classes and also exported."

(2) "The Sierra, including the puna or tableland, the region of the Cordillera of the Andes, is about 300 miles wide, and contains the most stupendous mountains, whose scenery is unequalled in beauty, vast plains and pasture lands, and warm and fertile ravines and valleys. The Sierra is the native place of the potato, the abode of the vicuña and alpaca, while in its recesses lie concealed the far-famed and inexhaustible treasures of Peru."

(3) "Montaña or tropical forests, skirting the eastern slopes of the Andes and extending over two-thirds of the Republic of Peru, are comparatively unknown, but they abound in products of the greatest commercial value, and will in some future time be the principal source of Peruvian wealth."

It might be inferred from the situation of Peru in the torrid zone that the climate would be warm throughout the country; but, owing to differences of elevation and the ruggedness of surface, every climate is enjoyed, and a settler may suit his taste to a nicety in choosing his location, whether his intention be to engage in agriculture, in manufacture, or in mining. Notwithstanding its tropical position, the country is healthful and free from those dangerous epidemics and diseases which generally prevail in the torrid zone. The coast, because of being a low land, should, according to its latitude, be exceedingly warm, yet three important factors neutralize the heat: first, the proximity to the Andes, with their perpetual ice; second, the Humboldt Stream that, coming from the South Pole with icy water, washes the coast of Peru, and, third, the cool, refreshing breezes from the south that blow all the year round. It is curious enough that in a tropical latitude, and even during the summer months, it should be almost impossible to bathe in some spots of the coast where the Humboldt Stream is particularly felt. The oval shape of the southern coast is due to the constant washing by this stream, which is named after the famous German scientist and explorer, who discovered it and explained its metereological effect on the western Pacific coast of South America.

On the coast the sun is rarely hidden by clouds, and rain seldom falls. Its general physical aspect is that of a sandy desert, except where irrigation by the streams that descend the Andean slopes have turned the desert into fertile valleys. These streams, dry during the winter months, and then often utilized as roads, become flooded with red muddy water during the thaw and rainy season on the Andean plateau.

The convenience of differences of altitude is apparent. Those who are not

satisfied with the climate of the coast, and desire cooler or even cold weather, have but to ascend the roads leading toward the Andes, the heat, of course, diminishing gradually as the higher altitudes are reached. On the Sierra it is as cool as in the south of England, on the coast it is as warm as in the south of France, and it is not very much warmer on the Montaña, while on the Puna or high plateaus it is as cold as in northern Scotland. The following table gives the mean annual temperature of the three zones at three different points :

COAST :		
Piura	77°	Fahr.
Lima	66°	"
Moquegua	63°	"
SIERRA :		
Cajamarca	52°	"
Huaraz	59°	"
Arequipa	57°	"
MONTAÑA :		
Iquitos	75°	"
Huánuco	74°	"
Santa Ana	72°	"

The Sierra is subject to rain in the summer and snow in the winter. Sir Clements R. Markham, writing on a typical Sierra town, says :

" From Cerro de Pasco there is a considerable descent southwards to the city of Jauja, the climate of which is said to be almost perfect for patients with pulmonary complaints. It is a charming little Sierra town, beautifully situated in an amphitheater of mountains, clothed to their summits with waving fields of barley The climate is delightful."

This important problem of the cure of consumption, which today so greatly preoccupies the attention of scientists, has been to a great extent solved in Peru, where doctors are unanimous in recommending a sojourn at Jauja to all those whose lungs are not sound. The construction of a sanatorium in the town of Jauja is projected.

In the Montaña there are two seasons—the dry, which lasts from May to October, and the wet, from November to April.

Professor Orton, speaking of a Montaña town, says :

" The city of Moyobamba stands in a most luxuriant place, with an altitude of about 2,700 feet and a mean annual temperature of 77° Fahr. The climate is delightful. Nature is so prodigal that everybody can get a living—except physicians."

Mr. Nötzli, M. E., writing of the same district, says :

" I have lived fifteen years in Cajamarca and in the Amazon provinces. The country is exceedingly healthy ; I have never experienced any illness whatever."

The Montaña, or forest region, is a zone but little known, except along the borders of the rivers that are constantly navigated by the rubber hunters. Covered throughout by virgin forests rich in all of the tropical products and traversed by a network of navigable rivers, it is undoubtedly the land of the future. Referring to this region, Humboldt wrote: "The headwaters of the Amazon sooner or later will be the center of the world's colonization."

On the coast wherever water has been obtained, either from the rivers flowing from the Andes or from artesian wells, the land becomes a veritable oasis covered by a rich and varied vegetation. Artificial irrigation alone is needed to produce fields of surprising fertility. The government has under study many problems of irrigation for the purpose of regaining little by little the desert sands. I may say that an expert from the U. S. Geological Survey and an assistant have been engaged by the government to study subterranean watercourses and the artesian-well problem, of vital importance to many provinces.

The plantations get their water generally during the summer months, when the floods rush down the streams. In certain departments, like Ica and Piura,

vine and cotton plants are planted in ditches about two yards and a half deep. When the rainy season comes the ditches are filled with water, the plants being practically submerged. The thirsty soil absorbs the water and preserves the moisture until the next watering season. In the Department of Piura this peculiarity is still more remarkable, as those lands that can not be irrigated because of the limited water supply depend for their moisture on the periodical and copious rains that occur, curiously enough, about every seven years. During this long period the tracts remain unwatered, and yet continue to yield crops of the best cotton in the world.

Cotton, which comes next to sugar cane among the agricultural products of the coast, is principally grown in the departments of Piura, Ica, and Lima. Piura produces the remarkable cotton called vegetable wool, known in Europe as "full rough" and "moderate rough." This cotton is unique in its class and is used for mixing with wool in the manufacture of woolen goods. So excellent is this cotton that even an expert may mistake it for wool. Its price varies in the market from 20 to 25 cents per pound as compared with that of the ordinary cotton produced in Louisiana, which varies from 5 to 15 cents per pound. It is imported in considerable quantity into this country.

The sugar cane is one of the most profitable of all the agricultural products of Peru, and can be successfully cultivated wherever there is sufficient moisture. Most of the estates are situated on the coast or on the margins of the rivers. It can be cultivated to an altitude of 4,500 feet on the western slopes of the Andes, and as high as 6,000 feet on the eastern slopes.

The production of sugar per acre, as compared with that of other sugar-producing countries, is as follows (a quintal equals 101.5 pounds):

Name of country.	Quintals of cane.	Quintals of sugar.
Peru	700	56
Java	312	31.2
Sandwich Islands	290	29
Egypt	192	19.2
Louisiana	175	10.4

The total production of sugar at present amounts to about 160,000 metric tons a year. What is now wanted is the extension of the area of cultivation and the erection of additional central factories to profitably work these productive lands. The fact that the cultivation of the sugar cane and of most of the products grown along the coast of Peru depends upon artificial irrigation constitutes a valuable advantage by securing sure and permanent crops, and thus keeping men and mills economically at work all the year round.

Simmonds, in his work "Tropical Agriculture," says: "The green and ripe cane are seen in the same field in Peru; they may be cutting at one end and planting at the other, so that the ground is never idle."

The sugar cane grows to the height of 8 to 10 feet in twelve to sixteen months, and can be cut during a period of from five to seven years without replanting.

The home consumption of the sugar is about 20,000 tons per annum, and the total value exported in 1900 was $7,000,000.

I may mention among other products of this zone the following: Rice of the best quality; maize or Indian corn of several varieties, the soil yielding from two to three crops a year; grapes and every kind of fruits of both the temperate and tropical climates. So we have the banana and the apple on the same field; olives, tobacco, every kind of vegetable, alfalfa, cocoa, coffee, etc.

The vegetation diminishes and varies as soon as the coast is left behind and the foothills or lomas of the Cordillera are reached. Owing to the winter showers that give ample moisture, the soil is

covered with herbage and with innumerable yellow flowers that give a greenish-yellow tint to the pasturage that can be detected from the sea. Lying at a height of from 1,500 to 2,000 feet above the sea, the lomas give abundant and healthful food to a great part of the cattle of the coast during the months of June, July, and August.

The scenery in the Sierra or highlands is totally different from what is seen on the coast. The plateaus are surrounded by high mountains of rocky formation, covered with snow and perpetual ice on the summits.

Besides the mineral wealth, of which I shall make special mention, the following products are characteristic of this region: The coca shrub is one of the principal crops cultivated on the Sierra. It is quite a special product of the soil of certain parts of the Sierra. From its leaves cocaine is made, which is exported to Europe. Hamburg is doubtless the best market for cocaine. The market price of coca leaf is 25 cents per pound.

The cultivation of the coca plant is carried on at an altitude of 5,000 to 6,000 feet, and also in some of the warm valleys on the eastern side of the Andes. The seed is sown in January, the young plants being removed in the following year to specially prepared coca fields, where they are planted in rows. They continue to yield crops for forty years. When ready the leaves are picked, then sun-dried, and afterwards packed in bags. The trees soon recover their foliage. Of this plant Prescott says: "The dried leaves mixed with a little lime form a preparation for chewing, much like the betel leaf of the East. With a small supply of this coca in his pouch, and a handful of roasted maize, the Peruvian Indian of our time performs his wearisome journeys day after day, without fatigue, or, at least, without complaint. Even food, the more invigorating, is less grateful to him than his loved narcotic."

Wheat, barley, and oats are grown here, and with better transportation facilities they will supply the whole country.

Peru is the home of the potato. It is grown on the coast, but being subject to frost, the Peruvians rely chiefly on the crops grown in the Sierra. The best crops of potatoes are raised in Huamatanga, about 66 miles from Lima, at an elevation of 7,000 feet. Various products unknown in Europe, such as quinua, alcacer, and others, grow freely here.

Regarding the orchids, Humboldt wrote: "Such is the number and variety that the entire life of an artist would be too short to delineate all the magnificent Orchidea which adorn the recesses of the deep valleys of the Peruvian Andes." A good means of living could always be ensured by hunting out the many varieties, which always find a ready market in European countries.

The Sierra is the center for live stock, and provides meat and wool for the whole country. Upon the Punas, the coldest regions, live the alpaca, the llama, and the vicuña, and sheep and cattle are found in considerable numbers in the whole of this region.

The alpaca lives in a domestic state. It much resembles the llama, but has a smaller neck, and the head is relatively shorter. It is shorn every two years, and furnishes a wool more than 8 inches in length and weighing 6 pounds.

The vicuña differs only from the llama in the color and quality of its wool. The color is a kind of ruddy yellow. The wool is fine as silk and worth four times as much as that of the alpaca. The vicuña still lives in a wild state upon the high Andes. A few rare specimens have been domesticated when captured young.

During the last few years they have succeeded in obtaining a cross between the vicuña and alpaca, called pacovicuña.

This animal possesses characteristics greatly superior to those of the original. The wool is of better quality and of longer staple. It is as long as that of the alpaca and as smooth and silky as that of the vicuña. The animal is easily domesticated. Today the raising of the paco-vicuña is one of the most important industries to be developed.

The llama is of large size (6½ feet high from the sole to the head) and the body is covered with a rough wool. It has existed in a state of domesticity from the earliest times. The Indians used it as a beast of burden many centuries before the arrival of the Spaniards. It is a precious animal in every sense of the word. It possesses the power of walking whole days with a burden of 100 pounds. This weight appears to be its normal burden, as if exceeded by only a few pounds the animal falls down as if to demonstrate that it is overburdened. As it takes its food while walking along, its pace is necessarily slow. It is so obedient that there is no need to use a stick. They are usually employed from the age of three years, and can be worked up to twelve years of age.

About 60,000 bales of wool are produced annually, nearly all of which come from Cuzco and Puno.

Peru is above all a mining country. The eminent naturalist, Raimondi, in his book, "Minerals of Peru," says: "The abundance and diversity of minerals that exist in Peru are truly prodigious. They are found in every one of its regions."

For hundreds of years the great mineral wealth of Peru has been known to the civilized world. The extent and variety of the deposits are such that it is practically impossible to mention the mineral that does not exist there, and most of them in abundance. The new mining code, containing the most liberal laws, will give still greater impetus to the progress of mining in Peru. The exploitation of the mining industry is entirely open to all comers, without distinction of nationality. The only mining tax is the half-yearly payment of $7.50 per claim. Each claim measures about 10 acres. Up to June 30, 1902, 6,380 claims had been registered in the "Padron General de Minas."

The importation of machinery, implements, and tools for mining purposes is duty free, as is also that of coal, dynamite, timber, quicksilver, and also rolling stock and all materials for use in the construction of railways.

In writing of the Peruvian miners, Mr E. Lane, C. E., English mining engineer, says: "In comparing the labor of the Cholos or Indians with that of the Anglo-Saxon labor, the opinions differ much. The average daily rate of pay for the Cholo laborer is from 50 to 75 cents. The writer has come to the conclusion that as regards the relative cost of the work, there would not be much difference between them and the more highly paid Anglo-Saxon. Most of the skilled labor is done by foreigners or by people of foreign extraction. The Indian of the Sierra is mild and inoffensive, willing to work, and easy to manage."

Gold is found on the coast region of Peru, in veins of ferruginous quartz. In the mountainous districts of the Sierra it is present both as alluvial and in lodes, associated with silver and copper. On the Montaña gold is found in the alluvial deposits along the slopes of the valleys, also in the rivers, and in the numerous veins crossing the formation of silurian rocks, which predominate in this vast zone. On the coast the richest region in gold is Camaná; in the Sierra, in Huanuco, Aymaraes, Cotabamba, etc., and in the Mantaña, in Pataz, Paucartambo, Sandia, and Carabaya.

A number of companies possessing modern machinery have been established to work these gold mines, among which the Inca Mining Company of Bradford, Pa., is prominent.

Both the production and the exportation of gold in Peru are on the increase. Sir Martin Conway, the explorer, announces that placers have been discovered, or, rather, rediscovered, in Peru, the sands of which are so rich in gold that they will in the future seriously compete with the gold fields of the Transvaal, Alaska, and Australia. In the province of Sandia alone 290 important deposits have been discovered, and there are at least as many more in the province of Carabaya. This region of the Andes is the richest in gold of the whole world.

The department of Junin, from its central position, its cereal resources, its iron roads, and its navigable waters, which flow toward the Atlantic, is surely destined to be the scene of great development in the early future. We do not exaggerate when we state that its chief town and its silver mines of incalculable richness will suffice to attract the attention of the entire world, as formerly did Potosi, California, and Australia.

It is calculated that this mineral district produced between 1784 and 1889 about ten milliard francs of silver ($200,000,000). Today (1890) only the tailings abandoned by the old miners are being worked, but these produce an annual amount of 34,000 kilos (68,960 pounds avoir.) of silver.

This mining district, which for nearly three centuries has been exploited for its richness in silver ores, is to be in the near future one of the principal copper-producing centers in the world. The Haggin-Vanderbilt syndicate, organized by several New York millionaires, purchased in 1901 about two-thirds of the mining claims in the district and has built a railroad of about 100 miles that connects the Oroya terminal with the mines. The total investment up to the present is estimated at $10,000,000. A smelting plant is being built for the syndicate, that will have a working capacity of 1,000 tons a day. The engineers in charge roughly estimate a yearly output of 50,000 tons, representing $12,000,000. The plant, to be worked by electricity generated by water power, is expected to be completed before 1906.

At Yauli, which lies to the south of Cerro de Pasco, 225 silver mines are in operation; in the province of Haurochiri, 117; in Huancavelica and Castrovirreyna, 54; in Caylloma, 24, and at Puno over 50.

Mr E. C. Lane, C. E., writes: "Silver is found almost everywhere in the Cordillera and in various combinations with different metals."

The chief districts in which copper is found are Pisco, Ica, Lomas, Chimbote, Cerro de Pasco, Yauli, Cajamarca, Huancayo, Andahuaylas, Cuzco, and Moqeugua.

Iron is found in various parts of Peru. The best known are the Tambo Grande mines (Department of Piura).

Coal is found in many parts of Peru, both in the Sierra and on the coast, being used in considerable quantities in the smelting plants. It is not exported because of lack of transportation facilities.

Petroleum is obtained exclusively, so far, in the Province of Tumbes and in the Department of Piura. There are two companies working these mines, viz., the London and Pacific Petroleum Company and the Establicimiento Industrial de Zorritos.

The total output of these companies is worth $350,000 per annum. Some of the wells at Tumbes have been sunk to a depth of 900 feet. The kerosene is consumed in Peru, and a considerable quantity of crude oil is used as fuel by factories, trades, and other industrial undertakings. Petroleum is also found in the Department of Puna, close to Lake Titicaca. Another valuable substance extremely abundant is sulphur, which is found in many provinces in

Moquegua, Tarata, and Piura. Mercury, cinnabar, or quicksilver is also found, the most celebrated of all the deposits being at Huancavelica, and is known by the name of Santa Barbara. There are many salt mines in Peru, the total production in 1901 being 15,750 tons. Borax, gypsum, and alabaster are found in large beds in the south, and every day sees an increase in their development.

The transportation system of Peru on land, as well as on water, descends gradually from the commodious and up-to-date railroad and steamship to the trail of the wilderness and the canoes of the rivers.

The first effort of importance at railroad building was undertaken by the government in 1869, when almost all of the existing roads were begun. The loans of 120 million, floated in Europe at that time, were applied to this purpose. Some short lines, however, had been previously built by private enterprise. The total railroad mileage today is about 2,000 miles. With uniform easterly direction, all the railroads serve the same purpose, to give outlet to the products of the valleys they traverse. Two of these, however, are of special importance, because they tunnel the Andean range at a considerable altitude, and are a wonder to the world as veritable masterpieces of engineering. One of these starting from Callao reaches today the mining district of Cerro de Pasco, and another beginning at Mollendo ends by two branches at Puno and Sicuani. The following extract from the *Engineering and Mining Journal* for January, 1904, written by an American engineer, gives a clear idea of the road:

"One of the most interesting trips afforded by the present transportation facilities of the country is that over the Oroya Railroad, which now runs from Callao to the gold fields of Cerro de Pasco. It is considered one of the wonders in the Peruvian world, and the original contract was taken by Mr Meigs at $27,600,000 in bonds at 79. It is certainly the greatest feat of railroad engineering in either hemisphere, and as a specimen of American enterprise and workmanship it suffers nothing by comparison. It was begun in 1870 and finished in 1876, and additional work has since been done on it. Commencing in Callao, it ascends the narrow valley of the Rimac, rising nearly 5,000 feet in the first 46 miles. Thence it goes through the intricate gorges of the Sierras till it tunnels the Andes at an altitude of 15,645 feet, the highest point in the world where a piston rod is moved by steam. The wonder is doubled on remembering that this elevation is reached in 78 miles. One of the most remarkable things in connection with this road is that between the coast and the summit there is not an inch of down grade. The difficulties encountered in its construction were extreme."

Since 1876, when all these roads were completed, nothing of importance has been undertaken, with the exception of the Oroya and Cerro de Pasco Road, built last year by the Haggin-Vanderbilt syndicate.

Many causes are accountable for this: First, the war with Chile and the unsteadiness of governments up to 1894, that ensued as a consequence of the war; second, the lack of capital, government or private. Foreign capital could not be interested under the unsteady conditions prevailing. Now that peace is restored, being today an accomplished fact, the finding of a field for profitable investment is the only problem to solve. The difficulty is not an easy one to overcome; population, progressiveness, traffic, commerce, can not be created nor improvised. The Panama Canal is soon to be opened. Peru needs to prepare for the current of immigration that this waterway will

surely attract to her shores. She needs to build railroads, to open new fields, to develop them, and make them suitable for the new-comers.

These considerations decided public opinion and its representation in Congress to pass the recent railroad law.

By this law the executive is authorized to apply $500,000 this year, $750,000 next year, and $1,000,000 the year after next, and so on, as an encouragement fund for railroad building, to be spent either in the form of a subsidy per mile built or as guaranty of a certain percentage, not to exceed 6 per cent on investments. The roads whose construction is contemplated by the law are, first, one that, starting from a point between Cerro de Pasco and Oroya, shall reach another on the Ucayali River, which is navigable at all times of the year; second, one that, starting from Oroya, shall connect with the towns of Jauja and Huancayo, and, third, one that, starting from Sicuani, shall reach the historic and picturesque city of Cuzco. These sections of road are within the projected route of the Pan-American Railroad.

Besides this already considerable inducement, the following facilities are provided for by the law: Perpetual ownership of the lines; 25 years of exclusive privilege—privilege that excludes the possibility of any other competing line being constructed; free entry to all materials; land grants and further facilities.

Communication between the Orient of Peru, "the land of the future," and the coast was so difficult that it was not uncommon for persons wishing to go from Lima to Iquitos to travel via New York, Para, and up the Amazon. It was in order to avoid this roundabout journey that the government has spent over one million dollars in opening the so-called Via Central, which, starting at the terminal of the Oroya Railroad, reaches by land the navigable waters of the Pichis, then down the rivers until Iquitos is reached in twenty days.

The desire of the government to shorten distances between the Orient and the coast so that the products of the forest region can be exported via the Pacific, a shorter route than that of the Amazon, and finally the wish that the national defense be made efficient, have decided it to complete these railroads as soon as possible and at any cost.

The ideal of a through route by rail from New York to Buenos Aires is not an impossibility, so far as Peru is concerned. The tendency of railroad construction in my country is to complete a central road that shall connect Oroya and Cuzco, and extend from the latter point through Sicuani, utilizing the existing road to Puno, and from Puno to the Bolivian frontier. Bolivia has constructed a small road that is within the projected Pan-American route, while on the other side Argentina is today reaching with her rails the Bolivian frontier. So the day is not far distant when Lima wil communicate by rail with Buenos Aires.

The Amazon is formed by the confluence within Peruvian territory of the Ucayali and Marañon Rivers, and follows from its formation an easterly course with a slight northerly inclination. It receives numerous affluents both from its northerly and southerly banks, among which the following are worth mentioning: From the south the rivers Yavari, Yuruá, Purus, Madeira, etc.; from the north the Napo, Putumayo, Yapura, Rio Negro, etc.

The greater part of these rivers were explored by rubber hunters in the early part of the last century, and the interesting and exciting reports of their adventures, the beauty of the scenery, their encounters with uncivilized tribes, together with the richness of their river banks, attracted the attention of the government at Lima as early as the

fifties. Many expeditions have since that time been organized under government auspices, many of them failing because of the immense obstacles in the way—dangerous trails, wrecks in the unknown rivers, inclemencies of the weather, etc.—but many of them have produced excellent results.

Little by little the rubber trade has developed. Steam navigation by large liners has been established up the Amazon as far as Peru, and with minor craft through its many tributaries; the town of Iquitos has come into existence with its ten thousand inhabitants, and its future, as well as that of the whole region, is assured.

The imperfect results of former expeditions and the necessity of conducting them under a thoroughly scientific basis resulted in the organization of a "Board of River Navigation" in April, 1901. This board, while residing at the capital, has under its charge the organization of expeditions to our oriental region, and since it was founded three very successful expeditions have been carried out—one to the River Tambopata, a tributary of the Madre de Dios; another to the Inambery, also a tributary of the Madre de Dios, and a third expedition to confirm the famous discoveries of the isthmuses that separate the basins of the Yucayali with those of the Madre de Dios, Purus, and Yurua.

Each one of the expeditions was in charge of a military officer. The staff included a naval officer, who had charge of the study of the navigation of each river and had to report as to soundings, velocity of the streams, rise of waters during the rainy seasons, determination of geographic coördinates, etc.; a civil engineer, who was to study the work of improving navigation, the roads, bridges, etc.; a physician, who had as his duty to report on the biology of the regions traversed, climatology, diseases among the Indian dwellers, etc.; a naturalist, who was to make a collection and study of the zoölogy, mineralogy, and botany of the rivers explored; and, finally, a photographer, who was to take all the pictures and snapshots of interest that would serve to illustrate the reports of the expeditions. A map of each river, of each road, and plans of projected improvements were to be made. The reports of these three expeditions are most flattering as to results and have encouraged the Board of Navigation in the organization of others that will soon start on their way.

By far the most interesting one of the three expeditions is that to the isthmuses that separate the basins of the Ucayali, Madre de Dios Purus, and Yurua. The Madre de Dios is a tributary of the Madeira, and the other two of the Amazon directly. A glance at the map will show that the headwaters of these three rivers are within Peruvian territory, but until a few years ago they could only be reached through Brazil. A rubber hunter by the name of Fitz-Gerald, trying to avoid the long and tedious navigation down the Madre de Dios and then through the Madeira until the Amazon was reached, and desiring to transport his rubber via the Ucayali River, discovered an isthmus of about six miles that separated both basins. The report of this discovery, as well as that of other isthmuses separating the rivers Purus and Yurua from the Ucayali, and which made it possible for the Peruvian government to reach these rivers without having to cross Brazilian territory, caused the sending of the expedition mentioned, which has in every way confirmed the importance of the discovery.

Prominent among the products of this immensely rich region stands the rubber tree, of which there are many varieties. Coffee is also produced in considerable quantity and suffers nothing in comparison with the coffee of

other regions. Next in order follow the aromatic vanilla, the cocoa tree, all sorts and varieties of medicinal plants, palms with their many products, hardwood, and woods of every variety and description, the quina tree, from which quinine is manufactured, etc., etc. The zoölogy of the Montaña or forest region is as varied as its botany. I may mention as peculiar to this zone the savage pig or *jabalí*, the puma or Peruvian lion, the South American bear, the crocodile, the boa, and the monkey. Its mineralogy has been treated already in speaking of our mines and mining.

The policy of the government and legislation with regard to these lands is most liberal. Rubber lands or forest land in general may be purchased or leased at really nominal prices, namely, purchased at $2.50 for two and a half acres or leased at 50 cents yearly per two and a half acres. Free grants are made for lots not to exceed five acres. Our legislation in general, especially with regard to civil rights, does not make any distinction between the Peruvian citizen and the alien.

The future development of the country depends, however, on the opening of the Pacific route and the continuity of both rail and water transportation. Four hundred miles of railroad are to connect a port on the Pacific, say Payta, with Puerto Menendez on the Marañon. From the latter point and within a radius of 1,000 miles there are about 5,000 of navigable rivers, mostly within Peruvian territory. Payta is about 2,300 miles from New Orleans. Thus the heart of South America will be, when the canal is completed, about 3,300 miles from the nearest port in this country.

As commerce results, the products of our tropical zone will have to find a market in the temperate zone. Where will this market be? It will surely be at the nearest center of consumption; and as the United States will take this position when the canal is completed, our export trade is bound to be with this country. On the other hand, we are and shall be consumers of manufactures and other products, and while we today are principally supplied with the European article, will this be the case tomorrow, when the manufacturing centers of this country will be 3,000 miles nearer to us than any others?

Thus, in my opinion, there is no question as to the commercial relations between the United States and South America, nor as to the sure preponderance of this country over all others in the trade with the republics to the south. If this means something today, it will mean more in 20, 40, or 60 years from now, when our new countries will be flooded with immigrants and consequently with more consumers of American goods.

The Panama Canal will give us life. Peru is no longer to be in a remote corner of the globe. While today all the traffic with this country, for instance, is made via the Straits of Magellan, with a distance of 9,000 miles, tomorrow it will be done through Panama, with a distance of 3,000 miles only. While today it is impossible for us to attract immigration to our shores because of high rates produced by monopoly at the Isthmus, and monopolies in the traffic at both sides, it will no longer be so tomorrow, when the canal destroys the monopolies, when it will be free to all, and all compete for the traffic, with the result that low rates are established. Where, as heretofore, transit at the Isthmus has been not only inconvenient, but dangerous, because of unhealthy conditions and bullets of revolutionary outbreaks, the work of the United States government in the near future will insure health and order on the Isthmus and make the transit through Panama no longer an inconvenience, but a veritable pleasure trip.

To close my remarks, I wish to show you graphically our progress since peace

was established, and then read a few lines on our capital, the city of Lima.

Among the towns properly so called, Lima or Laima occupies the premier position. It is the capital, and is the manufacturing and commercial center of Peru.

It is connected with the port of Callao by two lines of railway and electric cars. The Northern Railway extends as far as the port of Ancon, while the southern line forms a connection with the watering places of Miraflores, Barranco, and Chorillos, about 9½ miles, with which another electric road has been established. Lima, containing a population of 130,000 inhabitants, with its spring climate and its proverbial hospitality, is one of those American towns where the foreigner can enjoy all the charms of the most polished society. The stranger is welcomed everywhere, and, provided that he only makes himself agreeable, every door is opened to him with much greater readiness than in the old world.

It is a modern city in every way, although preserving its picturesque colonial aspect. It has every improvement—electric light, gas, telephone, modern sewerage, splendid water supply, asphalt paving, etc.

The state of culture in Lima is more advanced than one would think. Its university is the most ancient in America, and is organized in the same manner as those in Europe, and in all respects has nothing to fear from comparison with the universities of the new world. The beauty of the city is being continually enhanced by the addition of new parks, avenues, monuments, squares, and public buildings.

Callao is the chief port of Peru, and its bay is safe, large, and sheltered. The docks, which cost £2,000,000, allow the largest ships to come right alongside the quays. There is a floating dry dock, its inner measurements being 300 feet long by 76 feet wide, with a depth of 29 feet 3 inches.

AGRICULTURE IN JAPAN

By U. S. Consul-General Bellows, Yokohama, Japan

ONLY 14,995,272 acres, or 15.7 per cent of the whole area of Japan, exclusive of Formosa, consists of arable land, and 55 per cent of the agricultural families cultivate less than 2 acres each; 30 per cent cultivate 2 acres and less than 3¾ acres, leaving 15 per cent of the farmers who cultivate farms of 3¾ acres or more. A comparison of the whole area under cultivation with the number of farm workers shows that, on an average, one man cares for a little less than an acre.

An American farmer will naturally wonder how the Japanese farmer can support his family from the produce of so small a farm, and how he employs his time on it. The Japanese standard of living is far below the American, and the income of the Japanese farmer is usually increased by his engaging in some subsidiary industry, such as rearing silkworms, reeling silk, or spinning, and by working for wages in the intervals of farm work. In his work on the farm he seldom uses a horse or other draft animal, and his tools are of a very primitive character. He fertilizes and cultivates very thoroughly, and is thus enabled to secure a more abundant harvest, besides often raising two or more crops a year on the same field. In the warmer latitudes of Japan barley, indigo, beans, and rape are grown successively on one

plat of ground within the space of a year.

There are no reliable data respecting the proportion of independent and tenant farmers, the latest published estimates being based on returns made fifteen years ago. According to these estimates, a little more than half the cultivated land was leased to tenant farmers, the remainder being worked by the owners. The lot of the tenant farmer is far from easy, the high price of land forcing him to lease on terms which leave him a very small return for his labor after he has paid for the necessary fertilizers. These conditions tend to retard the advancement of agriculture by preventing the purchase of new tools and hindering any effort the farmer may make to adopt improved methods.

The government has attempted to aid the progress of agriculture by laws respecting irrigation, the protection of forests so as to control the flow of rivers in the interest of the farmer, the formation of farmers' guilds, the rearrangement of farm boundaries, and the improvement of drainage systems. Small as the farms are, their parts are usually separated so that a farm of 2 acres may consist of several nonadjacent lots, the average size of a lot being about one-eighth of an acre. A law which went into force in 1900 provides for the rearrangement of boundaries by farmers exchanging fields for those owned by others so as to make the farms more compact and enlarge the fields to permit the use of horses and machinery, at the same time increasing the tillable area by straightening some boundaries and removing others. About 20,000 acres have already come under the operation of this law.

For the purpose of further promoting agricultural interests the government maintains a state experimental farm and nine branch farms. The work at these farms is largely theoretical, and is divided into eight departments, viz., seed, saplings, agricultural chemistry, entomology, vegetable physiology, tobacco, horticulture, and general affairs. The results of the investigations are submitted to thirty-eight experimental farms, created and carried on by the provinces with the help of a subsidy from the general government, and theories are here subjected to the test of practical application before general publication. Among the results already accomplished by this method are improvement in the quality and quantity of crops through more careful selection of seeds and better understanding of the varieties suited to the conditions in different localities; more efficient modes of destroying injurious insects; ability to minimize the injury from plant diseases, such as smut, mildew, pear cluster-cups, etc.; increased skill in the application of fertilizers, and the discovery of indigenous grasses suitable for meadows, all meadow grasses having formerly been imported.

The general government aids the local treasuries to maintain six local agricultural schools for the instruction of farmers' sons in the general principles of agriculture, surveying, veterinary science, and related subjects. The government also carries on an experimental tea farm, on which is a curing workshop; a laboratory for investigating the diseases of cattle and poultry; a cattle-breeding pasture for improving the native breeds of cattle for meat and dairy purposes, and two horse-breeding pastures for promoting the introduction of better horses.

Efforts have been made to introduce sheep raising and swine raising, but with only partial success. It is claimed that the conditions of climate and food supply present no serious obstacles to the success of sheep farming, but the statistics of 1901 showed only 2,545 sheep in the country. Swine raising has succeeded better, but can not yet be spoken of as an established industry of much importance, the number of

swine having remained in the vicinity of 200,000 for several years.

Besides the encouragement and assistance to agriculture furnished through the agricultural schools and experimental farms and laboratories, the government aids and promotes the development of agricultural interests by means of the hypothec banks. Recognizing that many operations necessary to the prosperity of agriculture require a heavy investment which will not yield immediate returns, and that farmers are therefore not able to pay the high interest or accept the conditions of short-time commercial loans, the government has established the hypothec banks for the special accommodation of this class of borrowers. These banks are under the direct supervision of the finance minister, subject to strict regulations, and in return receive a certain degree of support from the government. They are permitted to make loans only for the following purposes: (1) Reclamation of land, irrigation, drainage, and improvement of the fertility of the soil; (2) construction and improvement of farm roads; (3) settlement in newly reclaimed places; (4) purchase of seed, young plants, manure, and other materials required in agriculture and industry; (5) purchase of implements and machines, boats, wagons, or beasts for use in farming and manufacture; (6) construction or repair of buildings for use in farming and manufacture; (7) improvements in farming and manufacture not included in the foregoing clauses; (8) rearrangement of farm boundaries; (9) undertakings by credit guilds, purchase guilds, and produce guilds of unlimited liability and organized under the industrial-guilds law.

The credit guilds are organizations of the farmers for the promotion of their common interests, and in some respects resemble the coöperative home-building associations of the United States. When organized in conformity with prescribed conditions, they are permitted to borrow money from the hypothec banks on very favorable terms, and the members may often obtain loans which the circumstances would prevent them from securing except through the guild. These guilds also undertake works for the common benefit, especially such as concern control of the course and volume of rivers, irrigation and drainage systems, road building, reclamation of uncultivated land, measures for protection against insect pests, and similar enterprises.

Stable manure and night soil have been used as fertilizers by the farmers of Japan from time immemorial, but in recent years the supply of these has been found wholly inadequate to the needs of the land, and artificial manures have come into general use. As the farmers were liable to be imposed upon by the venders of these, the government in 1901 enacted a law for controlling fertilizers. This law requires those who manufacture or deal in fertilizers to procure a license, to submit samples of their goods to the proper officers for inspection, and to guarantee the alleged composition. The government has distributed 116 fertilizer inspectors among different districts and has appointed 20 chemists at the state experimental farms to take charge of the analysis of fertilizers. In 1902, 3,697 applications for analysis of fertilizers were made to the farms and 7,685 analytical tables were prepared. Lecturers sent out from the agricultural schools and laboratories have explained to the farmers the primary essentials of fertilizers and the different requirements of different crops, so that the farmers have become generally intelligent on these matters. In 1901 the artificial fertilizer manufacturing companies of Japan produced 62,400 tons; 151,000 tons of fish fertilizers were produced, and 83,967 tons of Chinese bean cakes were imported for use as fertilizers. Artificial fertilizers are

also imported from Great Britain, fish guano from Siberia, animal bone from China, and other fertilizing materials from different countries.

The principal agricultural products, named in the order of their acreage, are rice, rye, barley, wheat, beans, mulberries, sweet potatoes, millet, buckwheat, rape, red beans, Italian millet, tea, indigo leaves, potatoes, sorghum, tobacco leaves, cotton, and hemp. The area devoted to rice cultivation constitutes a little more than two-fifths of the total area of arable land. The greater part of the rice fields are in low-lying land, which can be easily flooded, but some upland rice is raised. Mulberry trees and tea plants are usually planted on land not suitable for more important crops, such as the slopes of hills, sandy dunes, and similar places. In the warmer parts of the empire barley and rape are often raised as a second crop after rice has been harvested, but farther north the excess of moisture required for rice leaves the land too cold for another crop the same year.

Stock raising is still in its infancy in Japan, and is not likely to become an important industry, owing to the high price of land and the coarseness of the native grasses, most of which are not fit for food for cattle or horses. Oats and maize as foods for farm animals are practically unknown, and what passes for hay is a kind of straw, which is chopped fine before it is fed to horses. A little less than one-sixth of the arable land consists of plains and pastures, and of this about two-fifths belong to the state and the imperial household, the remainder being owned by private stock raisers, who raise stock principally for tillage and draft animals. The natives are not accustomed to the use of butter or milk, and do not usually like the taste of them, and their religious prejudices have hitherto prevented the general use of meat of any kind, although they now seem to be developing a taste for all these kinds of food.

Farmers do not engage in poultry raising to a sufficient extent to provide the eggs needed for home consumption, these being imported from China to the value of over $500,000 per year. Fruit raising, under the stimulus of government encouragement, has advanced considerably, but is not yet an important branch of farming in this country. Bee culture is also engaged in to a limited extent.

LAKE CLARK, A LITTLE KNOWN ALASKAN LAKE

BY WILFRED H. OSGOOD, OF THE U. S. BIOLOGICAL SURVEY

LAKE CLARK is situated northwest of Cook Inlet, near the base of the Alaskan Peninsula, and, although comparatively accessible, it was not discovered by white men until 1891. In February of that year J. W. Clark, agent of the Alaska Commercial Company at Nushagak, and A. B. Schanz, of the Eleventh Census and of Frank Leslie's Alaska Expedition, ascended the Nushagak Valley with dogs and sleds, crossed the divide at the head of a small southeastern tributary of the Nushagak River, and descended to the lake which now bears Clark's name. This winter trip of Clark and Schanz gave but little opportunity for exploration, and since their rather limited ac-

count nothing further has been published about the region. It was, therefore, with considerable interest that I started in July, 1902, on a trip, the itinerary of which was to include Lake Clark.

There are two practical routes to the lake, one by way of Iliamna Pass, where it is necessary to cross the mountains between Iliamna Bay and Lake Iliamna, and another, almost entirely by water, by way of Bristol Bay, and thence up the Kvichak River to Lake Iliamna, which receives the waters of Lake Clark through the Nogheling River. It is also possible to go in summer or winter by the route of Clark and Schanz by the lower Nogheling and impassable for boats. The portage is about 6 miles in length, the first half being over rather swampy open country and the last through open forest on comparatively hard ground. The Nogheling is a large, swift stream from 25 to 30 miles in length; above the portage there is one stretch of a third of a mile of swift water easily descended by canoes, but difficult of ascent except at low water, when tracking is practicable; otherwise the stream is easily ascended.

Our first view of Lake Clark from some low hills near the head of the Nogheling River was not particularly impressive, as we were so situated that

Photo by Osgood

Mountains on Southeast Side of Lake Clark

way of the Nushagak and Chulitna rivers; but this is rather an arduous trip at either season. The natives use all three routes, although the last named has been rarely traveled in recent years. Our party entered at Iliamna Bay, and being fortunate enough to secure pack horses at the head of the bay crossed the 12-mile portage in one day to a small native village on Iliamna River, about 6 miles above its entrance into Lake Iliamna. Another day took us by canoe across some 30 miles of the upper end of Lake Iliamna to the Nogheling Portage, about 10 miles east of the mouth of the Nogheling River. A portage is necessary here to avoid the Petroff Falls, so called by Schanz, which are in we could see only the lower end of the lake, where the shores are comparatively low; but when once on the lake itself, with an unobstructed vista of the greater part of its length before us, the view was magnificent. The mountains, which are from 500 to 1,000 feet in height at the lower end of the lake, extend down either side of the narrow stretch of water, gradually becoming higher and higher and more and more rugged until in the extreme distance some of the highest with snow-capped summits seem to merge with the hazy clouds. Near the head of the main lake several detached peaks rise up seemingly from the middle of the lake, but a nearer view shows them to be some distance

inland. In reality the mountains are not very high, but their gradual increase in height from one end of the lake to the other and the misleading vista effect causes them to appear quite lofty. The higher peaks immediately surrounding the upper end of the lake are possibly 6,000 feet in altitude; others, which may be seen at a distance, are somewhat higher. All of the mountains on the south side and most of the others are of volcanic origin, evidently dating from no very remote geological period. Those about the upper end are very steep and only slightly eroded; there are no very deep canyons or wide valleys, no well rounded summits, but usually jagged rocky pinnacles instead. The slopes above timber line are so steep that there is no room for large snow banks, and although perpetual snow often occurs at such altitudes in this latitude, there is extremely little on these mountains. Several high-hanging glaciers may be seen, however, at the head of narrow canyons on the south side near the head of the lake. Granite is found on the north side and predominates for about 5 miles at the extreme end of the lake, perhaps being the termination of similar formations to the northward in the main part of the Alaskan Range. Mt Redoubt, which has been represented as rising from the shore of Lake Clark, is not visible from any part of the lake or from any of the peaks that we ascended. However, volcanic ashes, supposed to have been thrown from Mt Redoubt, were found in abundance all about the head of the lake.

Several of the streams that enter the upper part of the lake carry considerable glacial waste in suspension, which gives a grayish brown color to the waters of the entire lake. One of these streams, called the Tleekakeela by the natives, which comes in on the north side about 10 miles from the head, has deposited very large quantities of sand and silt, forming a wide delta, which effectually blocks that side of the lake and virtually cuts off the water above it as an individual lake. On the south side there is a strong current between this upper section and the main lake, and the channel is not more than 200 yards wide. The upper part, however, has no resemblance to the long, T-shaped arm which has been shown on recent maps. This stream, the Tleekakeela, is navigable for canoes or native bidarkas for a considerable distance, and the natives report a portage from some point near its headwaters to Cook Inlet, in the vicinity of Tyonek. This portage crosses at least one glacier and is probably rather a difficult one. Another portage which is much used by the natives extends in a northwesterly direction from the village of Keeghik through several low passes in the mountains to Trail Creek, a tributary of the Kuskokwim River. The trip is made in 2 or 3 days without heavy impedimenta, or, as the natives say, it is a case of "tree day, spose no paack; fi day, spose paack." Several white men have crossed this portage and report it not difficult. An expedition to the upper waters of the Kuskokwim River might find this a desirable route.

At the lower end of the lake and also on the north side of the Nogheling River are several old terraced beach levels, apparent evidence of a former occupation by salt water. The valleys of the Chulitna and Nushagak rivers also seem to have been part of a sea basin. The whole region is but little above sea level, and a very slight depression of the land would allow the waters of Bristol Bay to occupy the basins of Lakes Iliamna and Clark and the greater part of the valleys of the Chulitna and Nushagak rivers.

The stream entering the extreme head of the lake is also of good size, about 80 feet wide at the mouth and navigable for small boats some 20 miles.

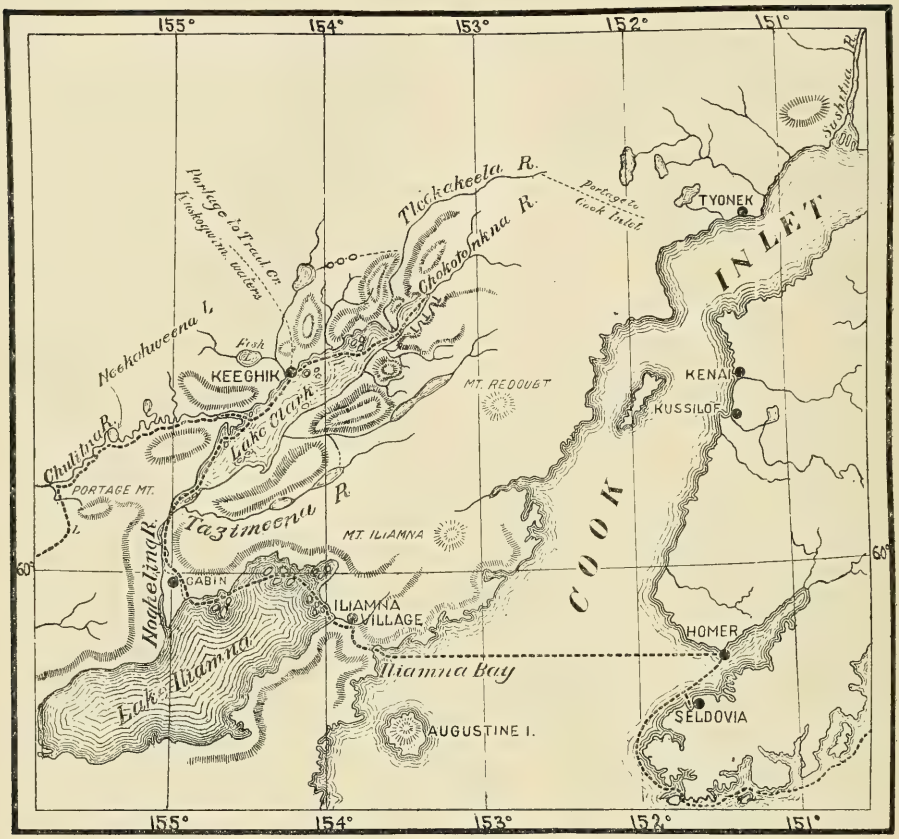
It is called Chokotonkna River by the natives, but several prospectors who visited it had designated it as Clark River. Portage or Achteedeedung Creek, which enters the north side of the lake about half way between Keeghik and the mouth of the Tleekakeela, is the only stream on which gold has been found. About half a dozen men have worked on this creek and secured a few fair samples of placer gold, but nothing that pays for working.

The natives of Lake Clark are collected in one village situated on the north side at the mouth of Keeghik Creek. They universally call this settlement Keeghik, although the name Nikhak, which has been used, is known to most of them. Keeghik is also the original native name for Lake Clark. The village consists of about a dozen houses and caches of hewn logs, very substantially and well made. About half a mile back from the present village are very ancient traces of a large village of former times. In 1891 Schanz enumerated 42 inhabitants of Keeghik, which is perhaps twice the number now there. Some were away at the time of our visit, so we saw only about a dozen.

Photo by Osgood

Natives of Keeghik Village, Lake Clark

Nearly all are of mixed blood, usually with considerable trace of Russian, but their main derivation has been from pure Indian tribes on the upper Kuskokwim drainage and the Kenai tribes from the head of Cook Inlet. Doubtless they may safely be considered the westernmost representatives of the pure Athabascan stock. Their language is now as much or more mixed than their blood, although the speech they profess as their



Sketch Map of Lake Clark and Vicinity

own is a dialect similar to that of the Kenai tribes. Very few of them speak much English, but nearly all are proficient in Russian and in modified Aleut, as well as in several Indian lingoes. They go to the coast frequently, but have suffered less from the deteriorating influences of the whites than most of their neighbors. They hunt and fish much as their forefathers did, though, of course, many of them have modern arms, and they do not confine their field to allotted or hereditary districts so much as formerly. Their main food supply is the salmon, which run up the Nogheling River in large numbers and enter most of the streams at the lower end of Lake Clark. Large game is not abundant on the immediate shores of the lake, and apparently never has been, but there are fairly good hunting districts within a few days' journey. An occasional moose or caribou is found about the lake, but neither is common, and the natives do no systematic hunting for them there. White sheep are found on the mountains between the lake and Cook Inlet, but they remain far back from the lake throughout the summer. Small game is much more plentiful. The Alaska spruce grouse is excessively abundant, and the Dall vary-

ing hare is also found in large numbers. Fur-bearing animals are not particularly abundant.

A good growth of timber surrounds the entire lake, the forest as a whole being of much the same type as that which occupies the greater part of the interior of northern Alaska. The white spruce (*Picea canadensis*) is the prevailing tree, and as a rule it is of very fair size. The average tree is about a foot in diameter, but some are larger; several measured breast high were found to be over 6 feet in circumference. In moist situations and on comparatively level ground the black spruce (*Picea mariana*) was found in abundance. The deciduous trees, mainly of three species, are scattered through the coniferous forest or gathered in thick clumps. The paper birch (*Betula papyrifera*) is perhaps most abundant, but it is not large, being exceeded by the poplar (*Populus trichocarpus*). The aspen (*Populus tremuloides*) is also found in many localities, and the usual alders and willows occupy their respective areas, while smaller boreal plants, moss, lichens, etc., are found in characteristic profusion.

The entire length of Lake Clark we estimated to be between 50 and 60 miles. Its width varies from two to eight or ten miles, the widest part being about opposite the mouth of the Chulitna River. We made no soundings, but the depth of water must be considerable, particularly on the south side, where the mountains rise abruptly from the water's edge. According to Schanz, bottom can not be reached in many places within 100 fathoms. On the north side, however, it is comparatively shallow. Numerous gravelly beaches occur there, and small islands are scattered along near the shore.

The general contour of the lake, particularly the upper part of it, we found quite different from that usually shown on maps of Alaska, and I have been unable to ascertain the origin of the large T-shaped arm, which does not exist, but which appears on all maps where the lake is indicated at all. Our time was so occupied by other work that we were unable to attempt anything in the nature of an accurate map of the lake, but a few hasty sketches were preserved. Our photographs were also none too good, as the films were not developed until several months after the exposures were made, and meanwhile were carried in a canoe on a long trip during continuous wet and very stormy weather.

THE GEOGRAPHICAL PIVOT OF HISTORY

THE PHYSICAL FEATURES OF THE WORLD THAT HAVE BEEN IN THE PAST AND WILL BE IN THE FUTURE THE MOST COERCIVE OF HUMAN ACTION

AT a recent meeting of the Royal Geographical Society in London Mr H. J. Mackinder delivered an address on "The Geographical Pivot of History," in which he asserted that the pivot around which the destiny of nations has revolved in the past has been the great steppes of interior Asia—of Siberia and Mongolia—and that the history of future centuries will revolve even more dependently around these enormous plains, whether dominated by the Russian, Chinaman, or Japanese. In other words, the social movements of all times, past and future, have played and are to play around the same physical features, the heart of Asia. There is much food for thought for this ap-

parently startling statement, though probably not many Europeans and few Americans can accept Mr Mackinder's arguments and conclusions, as far as the future is concerned.

Mr Mackinder begins by calling the last four hundred years the Columbian era, inasmuch as the great motive of this period has been the discovery, occupation, and development of the new world—the expansion of Europe. The exploration of the world is now completed; there are no new outlets to be opened by discovery and a new era must begin. The nations today are in the same condition they were in four hundred years ago, before the voyage of Columbus. They are all fenced in once more, and now, as then, every explosion of social forces, instead of being dissipated in a surrounding circuit of unknown space and barbaric chaos, as during the Columbian era, will be sharply and destructively reëchoed from the far side of the globe.

At the beginning of this new era all nations once more face the vast interior expanse of Asia; from it during the new era will come again the most coercive forces for the action of nations.

Mr Mackinder recalled how all the great invasions of Europe in the pre-Columbian era came from central Asia, entering through the gap between the Ural Mountains and the Caspian Sea. For successive centuries Europe was nearly swept away by these resistless hordes—Huns, Avars, Bulgarians, Magyars, Mongols, and Kalmuks. The full meaning of Asiatic influence on Europe is not, however, describable until we come to the Mongol invasions of the fifteenth century; these hordes gathered their first force 3,000 miles away, on the high steppes of Mongolia. All the settled margins of the Old World sooner or later felt the expansive force of mobile power originating in the steppe. Russia, Persia, India, and China were either made tributary or received Mongol dynasties. Even the incipient power of the Turks in Asia Minor was struck down for half a century.

The strength of Asiatic hordes lay in their mobility, and ceased when they entered the forests and mountains.

The grim determination of European peoples to check these successive hordes and not be crushed into a widespread despotism was the principal reason of European advance and unity during all these ages. Thus the spirit which stimulated the peoples of Europe and made them progress was the healthy and powerful reaction against pressure from the steppe lands of Asia.

The discovery of the New World changed the relations of Europe and Asia. Europe no longer watched in dread for what might come from Asia. She turned her back on Asia and founded new Europes beyond the oceans.

But now the whole world is occupied and well filled with people, save only the vast steppes of Euro-Asia. Europe is fenced in again as she was 400 years ago, and can expand no farther. The land power, the steppes of the Russian Empire and Mongolia, dormant while the oceans were being overrun, will now reassert itself. Railways are to give the steppes mobility and replace the horse and camel. Here there is room for hundreds of millions, who shall derive countless riches from the wealth of fertile plains, boundless forests, and neighboring mountains.

For the first time within recorded history we have a great stationary population being developed in the steppe lands. This is a revolution in the world that we have to face and reckon with.

"As regards the potentialities of the land and of the people, I would point out that in Europe there are now more than 40,000,000 people in the steppe land of Russia, and it is by no means yet densely occupied, and that the Russian population is probably increasing faster than any other great civilized or

half-civilized population in the world. With a decreasing French population and a British not increasing as fast as it was, and the native-born population of the United States and Australia coming nearly to a standstill, you have to face the fact that in a hundred years 40,000,000 people have occupied but a mere corner of the steppe. I think you are on the way to a population which will be numbered by the hundred million. ". . .

"The steppe lands are the heart of Euro-Asia; that continuous land, ice-girt in the north, water-girt elsewhere, measuring 21 million square miles, or more than three times the area of North America, whose center and north, measuring some 9 million square miles, or more than twice the area of Europe, have no available waterways to the ocean, but, on the other hand, except in the subarctic forest, are very generally favorable to the mobility of horsemen and camelmen.

"To east, south, and west of this heart land are marginal regions, ranged in a vast cresent, accessible to shipmen. According to physical conformation, these regions are four in number, and it is not a little remarkable that in a general way they respectively coincide with the spheres of the four great religions—Buddhism, Brahminism, Mahometanism, and Christianity. The first two are the monsoon lands, turned the one toward the Pacific, and the other toward the Indian Ocean. The fourth is Europe, watered by the Atlantic rains from the west. These three together measuring less than 7 million square miles have more than 1000 million people, or two-thirds of the world population. The third, coinciding with the land of the Five Seas, or, as it is more often described, the Nearer East, is in large measure deprived of moisture by the proximity of Africa, and, except in the oases, is therefore thinly peopled. In some degree it partakes of the characteristics both of the marginal belt and of the central area of Euro-Asia.

"Is not the pivot region of the world's politics that vast area of Euro-Asia which is inaccessible to ships, but in antiquity lay open to the horse-riding nomad, and is today about to be covered with a network of railways?

"Russia replaces the Mongol Empire. Her pressure on Finland, on Scandinavia, on Poland, on Turkey, on Persia, on India, and on China, replaces the centrifugal raids of the steppemen. In the world at large she occupies the central strategical position held by Germany in Europe. She can strike on all sides and be struck from all sides, save the north. The full development of her modern railway mobility is merely a matter of time. Nor is it likely that any possible social revolution will alter her essential relations to the great geographical limits of her existence. Wisely recognizing the fundamental limits of her power, her rulers have parted with Alaska; for it is as much a law of policy for Russia to own nothing over seas as for Britain to be supreme on the ocean.

"Outside the pivot area, in a great inner crescent, are Germany, Austria, Turkey, India, and China, and in an outer crescent Britain, South Africa, Australia, the United States, Canada, and Japan. Britain, Canada, the United States, South Africa, Australia, and Japan are now a ring of outer and insular bases for sea-power and commerce, inaccessible to the land-power of Euro-Asia. In the present condition of the balance of power, the pivot state, Russia, is not equivalent to the peripheral states, and there is room for an equipoise in France. The United States has recently become an eastern power, affecting the European balance not directly, but through Russia, and she will construct the Panama canal to make her Mississippi and Atlantic resources avail-

able in the Pacific. From this point of view the real divide between east and west is to be found in the Atlantic Ocean.

"The oversetting of the balance of power in favor of the pivot state, resulting in its expansion over the marginal lands of Euro-Asia, would permit of the use of vast continental resources for fleet-building, and the empire of the world would then be in sight. This might happen if Germany were to ally herself with Russia. The threat of such an event should, therefore, throw France into alliance with the over-sea powers, and France, Italy, Egypt, India, and Korea would become so many bridge heads where the outside navies would support armies to compel the pivot allies to deploy land forces and prevent them from concentrating their whole strength on fleets. On a smaller scale that was what Wellington accomplished from his sea-base at Torres Vedras in the Peninsular War. May not this in the end prove to be the strategical function of India in the British Imperial system? Is not this the idea underlying Mr Amery's conception that the British military front stretches from the Cape through India to Japan?

"The development of the vast potentialities of South America might have a decisive influence upon the system. They might strengthen the United States, or, on the other hand, if Germany were to challenge the Monroe doctrine successfully, they might detach Berlin from what I may perhaps describe as a pivot policy. The particular combinations of power brought into balance are not material; my contention is that from a geographical point of view they are likely to rotate round the pivot state, which is always likely to be great, but with limited mobility as compared with the surrounding marginal and insular powers.

"I have spoken as a geographer. The actual balance of political power at any given time is, of course, the product, on the one hand, of geographical conditions, both economic and strategic, and on the other hand, of the relative number, virility, equipment, and organization of the competing peoples. In proportion as these quantities are accurately estimated are we likely to adjust differences without the crude resort to arms. And the geographical quantities in the circulation are more measurable and more nearly constant than the human. Hence we should expect to find our formula apply equally to past history and to present politics. The social movements of all times have played around essentially the same physical features, for I doubt whether the progressive desiccation of Asia and Africa, even if proved, has in historical times vitally altered the human environment. The westward march of empire appears to me to have been a short rotation of marginal power round the southwestern and western edge of the pivoted area. The Nearer, Middle, and Far Eastern questions relate to the unstable equilibrium of inner and outer powers in those parts of the marginal crescent where local power is at present more or less negligible.

"In conclusion, it may be well expressly to point out that the substitution of some new control of the inland area for that of Russia would not tend to reduce the geographical significance of the pivot position. Were the Chinese, for instance, organized by the Japanese to overthrow the Russian Empire and conquer its territory, they might constitute the yellow peril to the world's freedom just because they would add an oceanic frontage to the resources of the great continent, an advantage as yet denied to the Russian tenant of the pivot region."

At the conclusion of Mr Mackinder's address, a number of objections were raised against his arguments by members of the audience. Sir Thomas

Holdich, the arbitrator of the Chile-Argentine boundary dispute, and one of the foremost authorities on South American matters in the world, made two points, as follows :

(1) One of the great reasons, one of the compelling reasons, for all the migrations from Asia has been a distinct alteration in the physical condition of the country.

(2) South America will be a potent factor in the outer belt of power to bring coercion to bear on the inner power pivoting about the south of Russia.

"The potentiality of South America as a naval power I look upon as very great. I believe that in the course, say, of the next half-century, in spite of the fact that just now Argentina has sold two ships to Japan, and Chile has sold a couple of ships to us, in spite of that fact, there will be an increase of naval strength in South America, resulting from purely natural causes, for the defense of her own coast and the protection of her own traffic, which will be only comparable to the extraordinary development which we have seen during the last half-century in Japan."

Mr Amery made three points :

(1) As regards the supposed "hordes" of invaders which came from the interior, I do not myself believe there ever were those very large hordes and large populations in the interior. The fact is this : the steppe populations were small then, as now, but from the fact of their mobility the heavier and slower military armies could not successfully attack them. You remember the difficulty the Roman legions had with the Parthians, and I think we can find a very much more recent example of the difficulty a civilized state finds in conquering a steppe power. Only a short time ago the whole of the British army was occupied in trying to coerce some 40,000 or 50,000 farmers who lived on a dry steppe land.

(2) In the old days the ships were mobile enough, but they carried few men, and the raids of the sea people were comparatively feeble. I am not suggesting anything political at the present time. I am merely stating a fact when I say that the sea is far better for conveying troops than anything except fifteen or twenty parallel lines of railway.

(3) Both the sea and the railway are going in the future—it may be near or it may be somewhat remote—to be supplemented by the air as a means of locomotion, and when we come to that (as we are talking in Board Columbian epochs, I think I may be allowed to look forward a bit)—when we come to that, a great deal of this geographical distribution must lose its importance, and the successful powers will be those who have the greatest industrial basis. It will not matter whether they are in the center of a continent or on an island. Those people who have the industrial power and the power of invention and of science will be able to defeat all others. I will leave that as a parting suggestion.

NATIONAL GEOGRAPHIC SOCIETY

IT is hoped that all members of the National Geographic Society, when they come to Washington, will visit the home of the Society, Hubbard Memorial Hall, Sixteenth and M streets, and make it as far as possible their headquarters while in the city.

It has been suggested that as there is no established abbreviation for Alaska, Aaa. would make a convenient and distinctive abbreviation. This form would not be confounded with the abbreviation for Alabama. The suggestion is made by William A. Kelly, superintendent of the Industrial Training School, Sitka, Alaska.

GEOCRAPHIC LITERATURE

The Gems of the East. Sixteen Thousand Miles of Research Travel Among Wild and Tame Tribes of Enchanting Islands. By A. Henry Savage Landor. 8vo. Pp. 13 + 567. Profusely illustrated. New York and London: Harper & Brothers. 1904. $4.00.

In his account of 250 days' travel in the Philippines, Mr Landor has given the most complete and accurate description of these beautiful islands, their climate, people, and customs, which has yet been published in popular form.

In following him through his various adventures in the islands, one is occasionally asked to believe that only an Englishman could have escaped with his life from savage, crafty natives, cholera epidemics, storms, and starvation; but, upon the whole, there is apparently little exaggeration, and the story of his trip is unusually entertaining and instructive.

While he probably traveled over little ground which had not been previously covered by American soldiers or prospectors, he, being a keen, trained observer, saw far more than they, and he came in closer touch with the people. To the ethnologist his book is especially valuable, careful attention having been given to the characteristics of each tribe with which he came in contact. Many measurements among the different tribes are given, and the book is well supplied with excellent illustrations.

Mr Landor lays great stress upon the agricultural wealth of the islands and the need of instruction in the best methods of farming. This, he thinks, should take the place of some of the other teaching which the people are receiving in the public schools. He deprecates the teaching of English, while at the same time advocating means of general communication among the different tribes. It is somewhat difficult to see why he should not consider it an advantage to them to have a common tongue. In their dealings with other nations, English would unquestionably be more useful than Spanish, with which language, by the way, less than one-tenth of the people are acquainted.

If any fault can be found with this interesting volume, it is that so little is said about the civilized people of the islands. It is not surprising, however, that Mr Landor devotes most space to the wild tribes, as his travels have generally been among little-known, savage people rather than among the more civilized; but it must be borne in mind that the wild tribes of the Philippines comprise only about one-eleventh of the whole population.

It is to be hoped that Mr Landor's readers will be fortunate enough to meet some of the educated, cultivated Filipinos who are now visiting the United States. They will then appreciate that there are as great differences among the people of the Philippine Islands as between our own educated classes and the wildest Indians of the West.

Mr Landor has many good words for the American army officers and civilians from whom he received much kindness and hospitality, for he is keenly alive to the fact that what the islands need more than anything else (except free trade with the United States) is men of the highest character in both public and private life. The changes which have taken place since American occupation and which are still going on are treated in an impartial manner.

In concluding the 567 pages of his book Mr Landor says: "In some eighteen years of travel I never enjoyed more than I did in this journey over these enchanting islands, really and truly the 'gems of the East.'"

M. C. G.

Manchuria and Korea. By H. J. Whigham. With map and illustrations. Pp. 245. 6 x 9 inches. New York. Imported by Charles Scribner's Sons. 1904. $2.00 *net.*

This book is the record of a journey through Manchuria made in 1901, and is one of the best of the many accounts of Manchuria that has appeared. Mr Whigham, of course, looks at everything Russian from the English point of view, but nevertheless he shows much appreciation of the order and stability that had been widely introduced in Manchuria, while lamenting the circumstances that had made Russia predominant. He speaks with much admiration of Harbin, particularly of its geographical position at the center of railway and river routes. The city will eventually become the Chicago of the Far East. At the time he visited the city he found it "chiefly remarkable for the number of its generals and its phonographs. The phonographs are imported so freely from America that every house seems to be haunted with an aged crone singing the music of 'El Capitan.' The generals come from St. Petersburg or Moscow by every mail."

The author on one occasion accompanied a Russian expedition sent to escort some junks down the river to Niuchwang. He gives an interesting account of the trip. As many as 5,000 junks attached themselves to the escort and thus reached the city without paying toll to bandits, who exact regular tribute from every junk plying up and down the river.

The boatmen regard the blackmail demanded by the pirates exactly as they regard likiu or any other tax. One robber with a gun appearing on the bank of the river is quite enough to stop fifty boats. In ordinary times the tax levied by the brigands is not very great, or at least not prohibitive, because the whole matter has reached the state of permanent compromise so dearly loved by the Chinese. The brigands have agents in Niuchwang, where the blackmail can be paid in advance at a reduced rate. "In the city there are several hundred rich men dressed in silks and satins, moving in the best Chinese society, who make their living entirely by piracy." A large part of the brigandage had been stopped by the Russians since the author was in Manchuria.

Mr Whigham repeatedly refers to the easy way in which the Russians mingle with the Chinese. Everywhere he saw Russians and Chinamen traveling in the same car, and Russian women and girls at the stations selling bread and drink to the coolies. Foreigners of other nationalities "would no more have thought of traveling on the same truck with Chinese coolies than a Southerner in the United States would think of sitting down to dinner with a negro." It is unfortunate that such an excellent book should be marred by a wretched and entirely inadequate map.

Steps in the Expansion of Our Territory. By O. P. Austin, Chief of the Bureau of Statistics, Secretary of the National Geographic Society, etc. Pp. 258. With many diagrams and maps. New York: D. Appleton & Co. 1903. $1.25.

This little volume summarizes the territorial growth of our country. The story is well told, the main facts being singled out and marshaled in striking manner. Mr Austin aims throughout to show wherein our growth has differed from any expansion in the past and what the main elements of this phenomenal territorial and commercial development have been. A special feature are the many diagrams introduced, illustrating clearly and in detail each step in expansion. The following paragraphs are quoted, the first from the introduction and the second from concluding chapter:

"The process of our national growth has been unique. Nations have usually been constructed by the conquest and

absorption of adjacent territory, by an alliance or consolidation of countries or communities, or by the planting of colonies which have remained subject to the parent country. But the spectacle of thirteen distinct communities uniting in one common organization and voluntarily creating from their unoccupied area other organizations of equal rank and power with themselves, until the newly created members of the family finally exceeded the original in number, in population, and in political power, is an unusual feature in national history."

"We scarcely realize how big we have grown. We proudly compare the growth of our manufacturing or exports with that of the United Kingdom, for example; but do not, apparently, stop to consider that the area of England is less than that of the State of Kansas, and that of the entire United Kingdom less than that of Kansas and Nebraska combined. When we compare our own conditions with those of France, we forget that its area is less than that of our two Territories of Arizona and New Mexico combined. We look with complacency upon the figures which compare our growth in manufactures, commerce, and population with that of Germany, but overlook the fact that all of the German Empire is smaller than our single State of Texas. The area of the thirteen colonies, as defined by the Peace Treaty of 1783, was equal to that of the present United Kingdom, France, Germany, Norway, and Sweden, whose combined population today is 143,000,000. The area added by the Louisiana Purchase is greater than the present area of Spain, Portugal, Italy, Austria, Hungary, and all of the Balkan States, with a combined population of 125,000,000. The area added by the Florida Purchase is more than that of the present Denmark, Netherlands, Belgium, and Switzerland, whose population today is 18,000,000. The combined area of the Texas, Mexican, Oregon, and Alaska additions is nearly equal to that of all European Russia, whose present population is 106,000,000. Thus our present area, including Alaska, may be said to practically equal that of all Europe, whose population in round numbers is 400,000,000 of people."

War Map of Manchuria and Korea. The War Department has issued a new and revised edition of the map of the seat of war in the Far East published by it several months ago and republished as a Supplement to the NATIONAL GEOGRAPHIC MAGAZINE for March. The map has been entirely redrawn, and is on a larger and hence clearer scale than the first edition. As the copies printed of the first edition for the use of the National Geographic Society have long since been exhausted, the Society has arranged for a considerable number of the new edition, which it will sell to applicants at 25 cents per map. The map is extremely useful to those following the armies in the East, inasmuch as it shows clearly all the roads along which the armies are moving.

A Catalogue and Index of the Publications of the Hayden, King, Powell, and Wheeler Surveys has recently been prepared by Mr L. F. Schmeckebier (Bull. No. 222). It is a valuable reference book for the student, investigator, and librarian, as the publications of these early government organizations constitute a storehouse of geographic, geologic, ethnologic, and archæologic information concerning the western portion of the United States.

A water route between the Atlantic Ocean and Lake Chad has been discovered by Captain Lenfant via the Benue and Logone rivers. The journey to Lake Chad via this route takes 69 days as against 155 by the former route by way of the Kongo, Mobongi, and Shari rivers. The new route can be used only during high water—August 1–October 15.—*Scot. Geog. Jour., April.*

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THE NATIONAL GEOGRAPHIC MAGAZINE

A WINTER EXPEDITION IN SOUTHWESTERN MEXICO

BY E. W. NELSON

BIOLOGICAL SURVEY, U. S. DEPARTMENT OF AGRICULTURE

THE southern end of the Mexican tableland is a broken plain, varying in altitude from 5,000 to 7,500 feet above the sea. Hills and mountains are distributed irregularly over its surface, with level valleys of varying size lying between. The soil is fertile, and these level areas produce abundant crops of wheat and corn, besides many fruits and vegetables of the temperate zone. The rainy season comes in summer, but the rainfall is often so scanty that the crops are much benefited by irrigation when water is available. The winter climate is ideal, with abundant sunshine and just enough frost at times to make the air bracing.

The land is mainly in the possession of wealthy *haciendados*, who usually live in the larger towns. The laborers, or *peones*, are paid scanty wages, and, according to our standard, are miserably poor. Their own point of view, however, is different, for, having but few wants, they are a contented and cheerful race, undisturbed by care so long as the day's needs are assured. Life among them is close to its primitive elements, families often living in little huts thatched with grass and cornstalks. These people vary greatly in their attitude toward passing strangers. During my years of wandering through remote parts of Mexico, however, I have frequently been compelled to claim their hospitality, and have often been received with a frank cordiality and delicacy of attention that would have done honor to a higher plane of life.

This part of Mexico is traversed by railways, and the resulting influence of the outside world is gradually affecting the picturesque local customs that are so attractive to visitors. Half a dozen cities, including the three largest in Mexico, are situated on the southern border of the tableland. They are full of interest, from the oriental character of much of the architecture left by the Spaniards, but modern improvements are now becoming much in evidence in the larger places.

The visiting tourist and his camera are still objects of curiosity to the street

Photo by Scott

At San Luis Potosi. A Street Crowd Watching a Photographer

Photo by Nelson

Loading Outfit on Pack Mules

crowd. This is especially marked if the visitor sets up his instrument in the market place. The people are good natured, and merely gather to watch the doings of the "gringo," whose ways are amusing but past comprehension. By focusing the camera away from the crowd and then turning it quickly a characteristic group can be secured.

The tableland is bordered on the south by the mountain wall of the Sierra Madre, which in this section has an easterly trend. A belt along the northern base of these mountains and including the adjacent edge of the tableland may be called the Lake District of Mexico. This belt extends from the valley of Mexico to the State of Jalisco, and contains over a dozen shallow, fresh-water lakes, varying in size from four or five to seventy miles in length. This belt also covers a considerable part of the area of the most recent volcanic activity in Mexico, and the lakes all owe their origin to changes of level due to volcanic forces. Situated more or less intimately among the foothills and outlying mountains of the Sierra Madre, they present many beauties of scenery that render them most attractive.

Lake Patzcuaro, in Michoacan, is especially noted for its beauty. It lies among pine and oak grown mountains, at 7,500 feet above sea level, and has several small islands on its bosom and a number of picturesque Tarascan Indian villages on its borders. One of these villages is Tzin-Tzun-Tzan, where in a rude little chapel is located the famous painting by Velasquez, representing the Descent from the Cross. After reading the highly flavored ac-

count in "A White Umbrella in Mexico" of a visit to this picture, one feels quite defrauded of his just dues of adventure in making a prosaic trip there on a raw-boned pony over a few miles of trail.

The eastern end of Lake Chapala, in Jalisco, was the starting point of the real work of our expedition. This is the largest fresh-water lake in Mexico, being about seventy miles long and fifteen miles wide. One of its peculiarities is that the inlet and outlet of the lake are both at the eastern end, and only a few miles apart. The Spaniards had the custom of naming both their streets and rivers in sections, and this accounts for the river flowing into Lake Chapala being called the Lerma, while the continuation of this stream, forming the outlet, is named the Santiago. Many small towns and villages are found around the shores of the lake, and considerable local trade is carried on in large, flat-bottomed boats, with square sails, and thatched roofs in place of decks.

Photo by Nelson

Boat on Lake Chapala, with a Square Sail and Thatched Roof Over Stern. This is the Largest Freshwater Lake in Mexico

Traffic among the people of this region is commonly on a small scale, and both men and women sell their wares, often the product of their own labor, in the market places. There is also a class of itinerant traders, who go from town to town, as markets are held on different days, carrying their wares upon their backs. These peddlers add greatly to the local color of the market places. The junk sellers, in particular, always excite interest from the strange collection of odds and ends they spread upon the pavement. Their wares include almost every imaginable object of metal from old coins to wicked-looking daggers and agricultural implements. In one such collection in an Indian town I found an old dueling pistol of excellent workmanship, bearing the name of a London maker.

There is a curious blending of the archaic and modern among the lower classes of Mexico. They patronize the railroads and buy many modern products, yet among them are found the survivals of various primitive industries. Many of them in the region about Lake Chapala still spin cotton by means of a slender spindle, with a clay whorl like those found everywhere in prehistoric village sites. The spindle is twirled

Photo by Scott

Indian Woman Spinning with Spindle, Lake Chapala. The Ancient Mound Builders Used to Spin in the Same Way (see page 344).

like a top in a bowl, the spinner deftly running out the cotton, then letting the thread wind on the spindle as the motion slackens. The thread made in this manner is afterwards woven on an equally primitive loom, which is attached at one end to the wall or a tree trunk and held taut by a broad band passing about the weaver's back.

The slopes of the hills about Lake Chapala are rather bare of large vegetation, but scattered cactuses of giant size give character to the landscape. The marshes about the eastern end of the lake are favorite wintering places for large numbers of ducks, geese, and other water fowl from the far north.

On December 24 we crossed the end of the lake in a large sail-boat to the border of the largest of these marshes, where we planned to spend Christmas among the birds. The day was brilliantly clear, with just a suspicion of frost in the air. As evening came on the wind fell, leaving us on the lake, where we could enjoy the marvelously

beautiful closing of the day. The sun had gone behind the distant mountains in a golden glory, and as the rich afterglow slowly faded the mellow sound of vesper bells came floating across the water. Then a brilliant array of stars came out and the black shore line twinkled cheerfully with village lights.

We slept in the boat, and were awakened on Christmas Day by the calling of flocks of wild geese as they took wing at the first glimpse of dawn. We found here the white-fronted and snow geese, marsh. The magnificent volume of sound from beating wings served as a background for the shrill clanging of the geese, and all united to produce an inspiring outburst of nature's music. In the afternoon we were delighted by the discovery of a colony of Mexican cormorants, nesting in a line of scattered bushes growing in a shallow part of the lake. As the nesting habits of this bird were previously unknown, this discovery was as fortunate as unexpected. By removing our clothing and wading waist

Photo by Scott

An Indian Woman Weaving with a Primitive Hand Loom, Lake Chapala

with more than a dozen species of ducks, besides various other water birds. The geese and ducks were present in vast numbers, and, as we advanced into the marshes in a small boat, they kept retreating by short flights, until finally they became massed in such numbers that there seemed no more room for them. Then they arose, thousands upon thousands, until the air was heavy with the mighty thunder of countless wings, and the horizon blackened by the hurrying forms moving to distant parts of the deep through the mud and water ahead of the boat, we secured photographs of some of the cormorants before they flew. There were many nearly completed nests, only a few of which contained eggs.

From Lake Chapala our route lay southward through the mountains away from the railroad, so that we were obliged to outfit for the trip by purchasing saddle horses and pack-mules and hiring a Mexican mule-driver. On the mules we carried our bedding, clothing, cook-

ing utensils, and supplies of all kinds, in addition to the specimens collected between shipping points. With this outfit, Mr. Goldman and myself, with our man, traveled about one thousand miles through a little-known country during the next few months. We were at home wherever night overtook us, only asking the place to furnish water, fuel, and grass. Traveling in this way has its irksome features, such as the daily packing and loading of the outfit, which takes an hour or more, but as a compensation one tastes all the joy of a wild free life under the open sky.

Photo by Goldman

Tarascan Houses, Cirosto, Michoacan

Notice the Projecting Wooden Pegs on the Roofs, also the Roofs to the Gates

In January we passed some time working on Mt Patamban, in Michoacan. The summit of this peak has an altitude of about 12,000 feet. This is near timber line, and the scrubby pine (*Pinus hartwegi*), tree alders, and bunch grass growing there were characteristic of the plant life found in the timber-line belt on all of the higher mountains of southern Mexico. In February we reached Mt Tancitaro, a little farther to the south. This mountain is over 12,000 feet high, and at the time of our visit the upper 1,000 feet of the north slope was covered with snow. Before making camp on Mt Tancitaro we made a preliminary visit to the western slope to find a good situation. Early in the afternoon we stopped in the dense forest on the mountain side, and while there heard a heavy subterranean report

like the distant firing of a great gun. We waited expectantly for the earthquake shock which former experience told us frequently followed such a sound. Nothing came of it, however, and the incident passed from our minds. As we rode down the mountain in the afternoon we had an unobstructed view across the lower land to the volcano of Colima, on the western horizon. The top of the volcano was hidden in a large, well-defined black cloud, forming a flattened oval mass, inclosing the entire upper part of the mountain and extending some distance in each direction. This showed that there had been an eruption of the volcano while we were in the forest, and the sound we heard had evidently been the explosion when the eruption began.

We camped in the midst of a noble forest of pines and oaks on the west slope of the mountain at about 7,500 feet altitude. All about us was a luxuriant undergrowth of flowering herbs and shrubs. Numberless blossoms gayly spangled the forest with brilliant purple, blue, white, and yellow. A little higher up the mountain was a forest of firs, and below were lindens, hornbeams, and dogwoods. We cleared a gently sloping spot just below a great oak log, and there, with nothing but the sky above and the forest round about us, we lived for about a week. Just at one side of the camp grew a patch of blue-flowered sage eight or nine feet high. Humming birds were constantly glancing about among these flowers, and many shy woodland birds took shelter

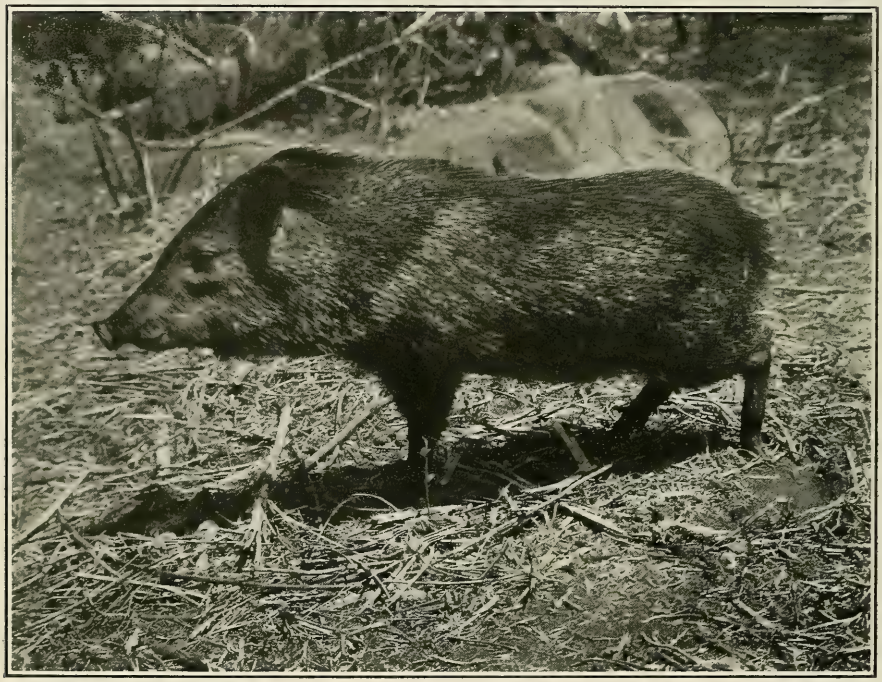

Photo by Goldman

Collared Peccary, Guerrero

Photo by Nelson

Papayo, a Characteristic Hot Country Village in Guerrero

among the foliage while they peered out curiously at the strange intruders. The memory of this camp is especially impressed on my mind by the extraordinary beauty of the sunsets. From our elevated position there were several points from which the view was unobstructed across 60 miles of intervening country to the volcano of Colima, on the western horizon. The recent eruption of the volcano had filled the air with fine volcanic dust, which at sunset caused the western sky to glow vividly rose red, flooding the mysteriously darkening aisles of the forest with rich shades of color.

The solitaire and other birds made music in the forest throughout the day, but the vesper song of the gray-breasted robin (*Merula tristis*), uttered during the expectant hush of twilight, was beyond comparison the most entrancing bird music I ever heard. Every evening the song of this bird came from some neighboring tree top with such exquisite melody that one almost forgot to breathe. Our mule-driver was one of the most stolid and unemotional men I ever saw, yet this song pierced even his shell.

Every day or two Indians came up the mountain, passing our camp, on their way to the summit after loads of ice, which they carried on donkeys down to the towns on the hot plains six or eight thousand feet below. The snowy summit of the mountain and the wintry scene across the top of the range made it difficult to realize while one stood chilled in the cutting wind that the yellow plains along the southern base were far

Photo by Goldman

Women—Half Negro, Half Indian—Going After Palm Nuts, Papayo

below frost line in the Tropics. My horse saw snow for the first time here, and it was only after long urging that he could be made to cross a patch of it.

This region was the home of the ancestors of our domesticated turkeys. They were found wild here, domesticated by the Aztecs, and introduced into the Old World by the Spaniards soon after the conquest. It was with a special desire to secure specimens of these birds that our camp was made on Mt Tancitaro. In this we were disappointed, though the Indian hunters who visited our camp said that wild turkeys were formerly abundant on the mountain, but that by watching the few watering places, the hunters had long ago exterminated them. They added that the deer on the mountain would soon be gone like the turkeys.

We passed our first night after leaving Mt Tancitaro in the village of Cirosto, a characteristic Tarascan Indian town, with numerous roofed gateways and houses walled with massive hewed planks well fitted together and without window openings. The doors and projecting ends of the rafters are often curiously carved and the hand-made shingles are fastened down with rows of wooden pegs with long projecting ends. This peculiar Tarascan architecture is strikingly picturesque.

The Tarascan country is covered mainly with open yellow pine forest, much like the forested plateau of northern Arizona. For many miles our trail

led through this forest. One morning we met some soldiers escorting three prisoners to a neighboring town. They were quite friendly and appeared to be pleased with our desire to secure a photograph of them.

From the cool mountain slopes we descended southward into the arid tropical

Photo by Nelson

Figtree Coiled on Nut Palm

regions of southern Michoacan. This is mainly a mountainous area with scattered plains here and there. The plains are usually like grassy prairies with irregular patches of scrubby trees and shrubs about their borders. After crossing one of the largest of these plains under the intense heat of the tropical sun it was a relief to reach the shelter of overhanging mahogany and other trees near the river at the bottom of a deep canyon. It was a wild and solitary spot, where we camped for about two weeks. Quite unexpectedly we found here the wild turkeys we were in search of. They were rather common in flocks, frequenting the sides of the canyon and coming to drink along the river. Another habitant of this place was a solitary old caiman, who lurked in the deep pools of the river and came out for two or three hours at midday to bask in the sun. The caiman of western Mexico ascends the larger rivers, particularly the Balsas and its tributaries, on one of which we were camped, several hundred miles from the sea.

Owing to the great diversity of physical conditions, the vegetation in Mexico assumes a wonderful variety of form, and presents a never-ending series of novelties to the traveler. On some sun-baked cliffs near our camp in the canyon was a singular agave, growing as though plastered on the bare rock, and quite unlike anything that we had ever seen.

From this camp we crossed several ranges of hills, sometimes forcing our way, without a trail, through dense jungles of scrubby growth to the recently extinct volcano of Jorullo. The summit of this volcano is only a little over 4,000 feet above sea-level, and the basal slopes are overgrown with scrubby arid-tropical vegetation. On the north side of the volcano, however, at about 3,500 feet altitude, is a small area of pine and other tree growth only found at a much higher altitude on the slopes of adjacent mountains. Jorullo was visited and described by Humboldt, who collected various new plants there. It is only recently extinct, and there is a bare black bed of lava on the northwest side where the crater wall is broken down. It is a small cone, only rising about 800 or 1,000 feet above the general

Photo by Goldman

Round Hut of Negros, South of Acapulca, Guerrero

The Negros in this region have crowded out the Indians. This is the same kind of house that their ancestors built in Africa

elevation, and is overtopped by some of the neighboring low mountains.

From Jorullo we again turned southward into the valley of the Balsas River. The Balsas is the largest river system of Mexico, its tributaries rising far in the interior of several states. The main river flows from the border of Puebla through the state of Guerrero to the Pacific. Throughout most of their courses the main stream and many of its tributaries flow through an arid mountainous region, sparsely populated, and with but little to attract exploitation except perhaps the possibility of mines. The immediate valley of the Balsas has an abundant growth of various kinds of large cactuses, with thorny shrubs and low trees.

A few days' travel beyond the Balsas, on a trail that seemed to wind endlessly over and about brush-covered hills, brought us to the coast of the Pacific. As we reached the crest of the last high ridge a fine view of the blue ocean refreshed our sun-dazzled eyes, and some whitened rocky islets a few miles offshore gave promise of our finding sea fowl there. We reached the shore at the small village of Sihuatanejo, situated on a bay of the same name. The bay of Sihuatanejo forms a good harbor, and has been considered as the possible terminus of a transcontinental railroad from the City of Mexico. The road has been completed for some years as far as the Balsas River, in central Guerrero, but whether it will be ex-

Photo by Scott

Curious Species of Agave Growing on Cliffs

tended across the mountains to Acapulco or follow down the Balsas and reach the coast at Sihuatanejo appears to be still undecided.

The day following our arrival, after securing a dugout canoe with three paddlemen, we made an early start for the bird rock. Many northern phalaropes were circling from place to place over the sea or swimming about as light as thistledown on the surface. It was the first time we had ever seen these little waders in Mexico, and finding them made an encouraging beginning to our excursion. As we drew near the islet an occasional red-billed tropic birdor bridled tern passed over, and soon a great swarm of birds could be seen about the rock. Among these were two species of terns, the tropic bird and Brewster's gannet.

The rocks rose so precipitously from the sea on all sides that it was only after circling them for some time that we found a possible landing place. Finally a ragged point, where the broken rocks gave hand and foot hold was chosen. Then the canoe was brought close in, and as the swell lifted it almost against the rocks, we made flying leaps from the bow and landed successfully with our cameras. The most beautiful habitant of these rocks was the tropic bird with its coral red bill, satiny white and black plumage, and long, filament-like middle tail feathers. Their graceful flight and long trailing tail feathers at once attract attention. Dozens of them were nesting in crevices among the rock, and one of the parents was usually at home, always ready to meet a trespasser with shrill cries and powerful thrusts of its sharp beak. They were so persistent in defense of their homes that they could be dragged out of the nesting holes before they would make any effort to escape. The gannets nested upon the surface, laying two eggs on the bare rocks or sometimes on a rude collection of moulted quill feathers which they gathered from the vicinity.

The most unexpected result of our visit to Sihuatanejo was the discovery of an inaccessible rocky islet rising about 200 feet above the sea, with numerous small cavities near the summit, which were occupied as nesting places by thirty or forty pairs of large red and green macaws. As the canoe ap-

proached its base, the macaws launched out from their perches and circled overhead, shrieking their protest at our presence. These birds commonly feed far inland; so their choice of a sea-beaten rock for a nesting place necessarily entails long daily flights to and from their feeding ground, but it affords absolute security for their eggs and young.

One's preconceived ideas of the tropics are usually of a region overgrown with luxuriant vegetation, always vividly green, and spangled with flowers, brilliant birds, and insects. In the arid tropics, however, quite the reverse is true during the long dry season. The length of the dry season is a controlling factor in limiting vegetation to a more or less stunted growth of jungle, including many thorn-bearing species. The low forests of the arid tropics are frequently as leafless during the dry season as northern deciduous forests in winter. Along streams and in low areas, where the underground water is near the surface, the trees attain a much more vigorous growth, and are vividly green throughout the year.

From Sihuatanejo we proceeded down the coast to Acapulco. The road was a narrow trail leading through endless jungle, and connecting a series of squalid villages standing in small clearings.

With the exception of birds, animal life was not much in evidence, although the collared peccary and a species of white-tailed deer was common. There are many tales in hunting literature of the fierceness of the peccaries, and they are undoubtedly stubborn fighters against any odds when brought to bay, but, so far as my experience goes, they appear to be much more dangerous in books than in their native jungles. All along the route to Acapulco we saw among the bushes smoothly made little roads, from which every leaf and twig had been removed and the ground cleaned as carefully as though swept each day. These roads were three or four inches wide, and usually led to a hole under a log or root, or sometimes to a large nest of dry sticks two or three feet high. The makers of these roads and nests are small nocturnal rodents, about the size of a house rat, which are peculiar to the tropical forest of western Mexico. The care with which they keep their roads free from twigs and other objects is surprising.

Here and there along the coast occur great ceiba or silk cotton trees. They are the giants among the plant life of this region, and among the noblest and handsomest of tropical trees. The pods of the silk cotton are large and well filled with silky down, which is gathered

Photo by Scott

Moated Corn Crib, near Cuernavaca

and exported to the United States for making pillows and mattresses.

Before reaching Acapulco we stopped for more than a week at the small village of Papayo. It is a characteristic hot-country village, made up of a collection of palm-thatched houses with walls of adobe brick or wattle. The center of the village is occupied by a large wide-spreading ceiba, while surrounding it for some distance in various directions is a magnificent forest of nut palms. The main industry of the people here is gathering the palm nuts and extracting the kernels. Every morning the village women went out into the forest with baskets to gather the nuts. The kernels are sent on pack-mules to Acapulco, where the oil is extracted and used in a soap factory conducted by Americans.

Our quarters were in an open thatched shed, which served as the living room for the family of the chief man of the village. It was a very comfortable place during the day, but at night the half-starved village dogs swarmed in and searched minutely for every edible scrap or fought and howled just outside.

Among all the forms of vegetable life in the Mexican tropics the wild fig trees are the most remarkable. There are many species, and they vary much in habits and appearance. Some of them show such apparent intelligence in their mode of growth and their readiness to meet emergencies that it is difficult to not credit them with powers of volition. In the tropics, where the wild figs flourish, there is a constant struggle for life among numberless species of plants. Seedlings on the ground have a hard time to reach an age of comparative safety. Certain of the wild figs appear to have learned this, and provide a fruit which is a favorite food for many birds; then an occasional seed is dropped by a bird where it finds lodgment in the axil of a palm frond high in the air. There, sheltered from danger, the seed takes root and is nourished by the little accumulation of dust and vegetable matter. It sends forth an aërial root, which creeps down the palm, sometimes coiling about the trunk on its way. When this slender, cord-like rootlet reaches the ground, it secures foothold and becomes the future trunk of the fig tree. After the descending rootlet has secured itself in the ground, a branch, bearing a few leaves, springs from the seed in the palm top, and a vigorous growth begins. Then the fig gradually enlarges and encloses the supporting palm trunk until the latter is completely shut in the heart of its foster child and eventually strangled.

All along the dry coast plains a species of large-thorned acacia is abundant. The great thorns are hollow, and each is pierced by a small round hole, which is the doorway of a fiery-tempered little ant-like insect which makes its home within. These thorns are so numerous and such singular-looking things that the new comer is always tempted to approach and take hold of a branch to get a closer view. Instantly the occupants of the thorn swarm out with marvelous rapidity over the offending hand. Each one seizes the skin in its jaws and then works a highly spiced sting so vigorously that one's curiosity is satisfied without delay.

The approach to Acapulco is commanded by bold and rugged headlands with many large cactuses on their seaward faces. This port has been of importance since early in the Spanish occupation. It is the best available harbor on the Pacific coast of Mexico and is an important coaling station. The town has long borne an evil reputation for its climate. It has about 4,000 inhabitants and a most flourishing graveyard.

The coast belt in both directions from Acapulco, especially to the south, is largely peopled by descendants of negroes who must have obtained foothold

here during the Spanish occupation. Although the majority of them are of mixed blood, there are apparently many full-blooded negroes. They speak only Spanish and have crowded out the original inhabitants. Most surprising of all, they have retained to this day in many of the villages the characteristic African round hut, with conical thatched roof.

From Acapulco we turned inland and a week later were at Omilteme, on the top of the high sierra which traverses the interior of Guerrero parallel to the coast. This is a limestone range with a very rough, broken summit, where, between six and nine thousand feet above sea-level, we found a magnificent oak and pine forest. Fan palms were abundant in the more open parts of the forest, while in the dark gulches, under the shade of the giant trees, were beautiful groups of tree ferns. Our stay here was very productive, as we found many rare birds which were lacking in our collection, in addition to several species previously unknown to ornithologists.

Several days after leaving Omilteme we reached a station on the railroad leading to the City of Mexico and disposed of our outfit.

Before arriving at the City of Mexico we passed through Cuernavaca, the capital of the State of Morelos. This is an interesting old place, with remains of the ancient Aztec occupation as well as of the Spanish times. One of the survivals among the Indians in this vicinity is the curious urn-like type of corncrib built with a projecting base and a channeled groove or moat in the base, which is filled with water to prevent ants and other destructive insects from gaining access to the corn.

At Cuernevaca, in the Valley of Mexico, and on the plains of Puebla we were constantly in sight of the great snow-crowned volcanoes which form the most inspiring views in Mexico. A vivid memory of these giant mountains lingered with us long after the rainy season arrived and caused us to return to the United States.

Photo by Scott

Lizard Carved in Relief on Rock, Prehistoric, Cuernavaca

BUILDING THE ALASKAN TELEGRAPH SYSTEM

By Captain William Mitchell, U. S. Army,

Of the United States Signal Corps

Under the personal direction of General A. W. Greely, U. S. Army, the United States Signal Corps has recently laid the submarine cable connecting Sitka and Seattle, thus completing the Alaskan Telegraph system of 2,500 miles. Fort St Michael, Valdez, and points on the Yukon and Tanana rivers are now in direct telegraphic communication with the world. Some of the fearful natural difficulties that were met and conquered in the frozen wilderness of Alaska by the Signal Corps officers and men are described by Captain Mitchell in the following article.

TO one unfamiliar with conditions in Alaska it is hard to give an idea of the difficulties of travel and the hardships which have to be encountered in constructing a telegraph line through that vast and little-known country. Suffice it to say that Alaska contains one of the greatest rivers in the world, the Yukon, navigable for 2,200 miles, though frozen over during 8 months of the year, and the highest range of mountains in North America, culminating in Mt McKinley, which is over 20,000 feet high. The weather varies in temperature from 100° in the summer to lower than 70° below zero in the winter, and to add to the discomfort of summer travel the mosquitoes are a terrible pest. The snowfall varies from 60 feet along portions of the coast to 4 feet in the remote quarters of the interior, and in the entire territory there is no road which is good enough for wagons to travel, and the trails in winter must be broken through the snow which covers the ice on the rivers or the rough and rugged land on the mountain sides.

It is an extremely healthful country and very rich in game and minerals. Except along the Yukon and the coast few white men can be found, the only inhabitants being the Indians, the last vestiges of once powerful tribes, who before consisted of thousands, but now are fast disappearing. It is a country of vast distances (in round numbers being about 1,400 by 2,000 miles in extreme breadth and length, respectively), yet with all its drawbacks and hardships its strange fascination appeals to one who enjoys adventure.

In the summer of 1902, when the lines between Fort Egbert and Fort Liscum had been finished by Captain G. C. Burnell working from the south, and myself working from the north, preparations were made at Fort Egbert for the final work, namely, the joining of some point on the Fort Egbert-Fort Liscum line to the line from Saint Michaels and Nome, the extreme western towns in northern Alaska, which Captain (then Lieutenant) G. S. Gibbs had succeeded in constructing up the lower Tanana River. This work, when completed, would put the above-mentioned places in communication with the outside world, from which they had been shut out before for more than five months of the year. All stores and equipment of special make for the work, special sleds, harnesses, and transport animals—dogs, horses, and mules—were sent to Fort Egbert. As practically nothing was known of the country between Fort Egbert and the lower Tanana River, reconnoissances were

made across to the Tanana and then down the Tanana for some 500 miles by boat, it being impossible to go directly through the country in question during the summer, as supplies sufficient for man and beast could not be carried. From these expeditions it was found that a northern tributary of the Tanana, known as the Goodpasture River, ran in the desired direction, as the divides or watersheds were observed to take a certain course. The source of this same river had been previously located, and by having been to both its head and mouth its general direction was fairly well established. When I returned to Fort Egbert in September of 1902, this was the sum of the information gained as to the course of the line.

As the winter was near at hand, when our utmost efforts would be necessary to make the proposed line a reality, no time was to be lost, since the line must be completed by June 30, 1903. Accordingly the transportation was organized into different trains, the dogs were picked out and matched into teams, and work was begun on the trail which the transport animals were to follow as soon as the country should freeze. The distance of the freighting line to the point where the work was to begin on the telegraph line was estimated, and a system for building stables for the horses and caches every fifteen miles was inaugurated. The men set to work on the trail during the last of September. Portions of the trail running through deep canyons were blasted out with dynamite; in other places bridges were built over warm-water springs in the creek beds, and at the requisite distances stables and caches were constructed of logs. These caches were connected with each other by wire laid on the ground and worked over by the Signal Corps buzzer instruments. In places where the ground was frozen to a great depth, making it of great electric resistance, it was necessary to build fires on the ground to thaw it, to make it possible to get a ground connection to use the buzzers.

During the first part of November I started out with Scout De Hous and our two dog teams to find out if the streams were fit for travel. We proceeded for about one hundred miles, breaking our trail with snowshoes over ice so thin that we broke through it frequently into water so deep that we were immersed to our shoulders, and the dogs were forced to swim. As the temperature was about 20° below zero at that time, great care had to be taken that we did not freeze, and as soon as we felt the cold working into us a fire was built and our clothing dried. Upon our return it was decided that the creeks were in an unfit condition for travel, and that we must accordingly wait for colder weather in spite of the delay thus caused. On November 25 the temperature dropped to 55° below zero, freezing the country tight, and through the gloom of the Arctic winter day the heavily laden sleds, the horses covered with rising steam, and the men muffled in their parkas and furs, started on their mission The trail was broken with snowshoes ahead of them, staked with brush, propped with logs, and made fit for the sleds to travel over. At first oats, hay, and rations were relayed out, and then the wire and line materials. When it was seen that the transportation was going forward satisfactorily—for this is always the greatest problem in any new country, and especially in an Arctic region—we set to work to exactly establish the course of the new line. As no white man nor Indian could be found who knew the course of the Goodpasture River, I obtained the services of an Indian, Chief Joseph of the Middle Fork tribe, who knew the best way of reaching its source.

On December 2 Scout De Hous and

myself, with our teams of seven and eight picked dogs, respectively, left Fort Egbert, accompanied by three horses and sleds carrying our rations and dog food, which were to go with us as far as possible for them. On the way out we picked up the Indian Joseph, and after some preliminary reconnoissance work to determine a good pass on the head of the Goodpasture, we reached the source of that river on December 19. There we sent back the horses, changed our dog sleds for toboggans, and made a cache on poles about 12 feet from the ground, so that the wolves and wolverines could not reach the provisions which we stored there to use on our way back. After loading our toboggans with 600 pounds each, we started, Indian Joe and I preceding the dogs, breaking the trail, and chopping out brush, while Scout De Hous managed the teams, following in our tracks. We started each morning as soon as there was sufficient light and traveled for eight hours steadily, averaging, with stops, about two miles an hour. At numerous points in the Goodpasture warm springs are prevalent, the water coming out at a temperature of 60° above zero, and many of these places had only a thin skim of ice over them. As they were covered with snow, it was often impossible to discover them as we ran along, until one or all of us would fall through into the water, and as the temperature was constantly falling, great care had to be taken to prevent freezing. At the end of the day's trip camp would be made and a fire blazing within ten minutes after we stopped. A place would be chosen near some dry spruce timber, the Indian would shovel a place in the snow with his snowshoes for the tent, get spruce boughs for the beds, and put up the tent and stove. Scout De Hous would chop the firewood and I attend to the unharnessing of the dogs and getting out our equipment from the toboggans.

By December 29 the temperature had fallen to 70° below zero, and it was almost impossible to keep our feet from freezing on the snowshoes, but we pushed ahead in an attempt to make an Indian settlement which we knew to be at the mouth of the Goodpasture. During the afternoon of December 29 I observed that Scout De Hous was lagging behind, and upon asking him what the matter was I found that he was in the stupor which always precedes freezing. As when a man is in that condition it only takes a moment for him to freeze to death, I halted and set the Indian to pulling down some dry spruce boughs for a fire, while I kept De Hous moving. Within two minutes we had the fire going, and when De Hous saw it he became distracted and jumped into the middle of it, badly burning himself, his moccasins, and clothing. It was then necessary to camp. I merely give this as an instance of what frequently happens in the Arctic, and of the care that has to be exercised to guard against being frozen to death. Only a few days before we left Fort Egbert, Scout De Hous brought in on his sled a prospector who had been careless and who had been frozen to death.

On January 1, 1903, we at last reached the mouth of the Goodpasture River, where it empties into the Tanana, and walked into a warm Indian cabin. Our hopes had been realized; an excellent course for the line had been found, and, as far as we could learn, we were the first white men to traverse the length of the Goodpasture. The Indians said they were starving, and begged, as is their custom. We gave them half of our tea, which was not much, and kept guard over the rest of our scanty store of provisions. These Indians are held in bad repute by the other Indians and white men, the white men saying that they are thieves and the Indians that they are "bad medicine men." We remained with them for one day, and then turned back. As our loads were much

lighter than when we started, we were able to make better time than on the way out, and we made as quick time as we could, as we were running short of provisions. The first day out we ran across a few Indians who did not belong to the same tribe as those at the mouth of the Goodpasture River, and who had been driven away from the Tanana, where salmon could be caught. They were without food, and had been keeping alive by boiling their moose-hide moccasins and drinking the "soup," as they called it. Their dogs were nearly all dead, and as we sat talking to them one of the dogs tottered up to the fire, fell into it, and died. The weather was so cold that with their poor equipment they could not hunt, so we gave them all the rice and dried salmon we could spare, and, as we afterward found out upon meeting them again, saved their lives by giving them the food. Had white men been driven to the extremities that these Indians were they probably could not have lived.

The day after meeting the starving Indians a peculiar incident happened, which illustrates the superstitious side of the Indian character. We had run 50 miles in two days after leaving the Tanana, and Scout De Hous and Indian Joseph had become a little sore from the excessive exercise, especially as we could not snowshoe for more than 8 hours, due to the short days, and hence were obliged to push on at as great a speed as we could. The dogs also had become a little sore, due to frost-bitten feet from traveling on the snowshoe trail in the extremely cold weather. The Tanana Indians had said something to Chief Joseph about giving too much help to the "Soldier Chief," and as he believed that they were great medicine men Joseph thought that he had been put under their spell and would never return to his wife and children alive. He was very gloomy and silent and was loosing heart in the face of the hard trip. So in order to counteract the influence of the medicine men I made medicine for him, and gave him a dose of salt and dried salmon mixed with a little of Perry Davis' pain-killer, which we were in the habit of using for frost bites. At the conclusion of the accompanying exercise and after tasting the fiery concoction Joseph was thoroughly cured, and he afterward assured me that I had saved his life. The strong belief of the Indians in the powers of their shamans is remarkable.

On the sixth day we reached our "grub cache" on the head of the Goodpasture River, having subsisted for the last four days on rice and dried salmon, and having covered 150 miles on snowshoes during that time. At the cache, where Summit Station is now located, we changed our toboggans for sleds again, went over the pass, and found that the transportation outfits had worked their way to nearly that point, which was a pleasant prospect after our six weeks on the trail.

The mass of supplies, amounting to about 300 tons, was put at the head of the Goodpasture, and the work was begun in both directions from Summit Station, a party also being started from Kelchemstock, the point selected for the joining of the Fort Egbert-Fort Liscum line with the Lower Yukon and Nome line.

The system found best to be employed was as follows: First the line was surveyed, next the right of way was chopped, then the wire was run over the snow, insulators, brackets, and nails being tied to the wire every quarter of a mile in sufficient quantities for the intervening distance. This was done because during the summer the pack animals can not pack the wire and move camps in the same manner that they can in the winter. In summer an animal can pack about 200 pounds, and in winter the same animal can pull on a sled from 800 to 2,000 pounds. It is also almost impossible to dig post-holes through the deep snow in winter. As the wire was

laid communication was kept up over it with the Signal Corps buzzer. By the last of April the wire had been run for the entire distance from Kelchemstock to the mouth of the Goodpasture. At this point we had expected to meet the party working up the Tanana, but due to unsurmountable obstacles it had not been able to get within 65 miles of that point. As I had kept in touch with the party down the Tanana, sufficient material had been put on the Goodpasture in the event that they did not reach the point of junction. Boats were accordingly built of whip-sawed lumber at Central, and as soon as the Goodpasture broke we loaded our outfit and went to the Tanana, also sending a pack train over the hills to coöperate with us on that stream, the aparajos and packing outfits having been previously sent to the Goodpasture on sleds. Meanwhile, parties with their pack trains were working between the various stations, putting in poles and elevating the wire. All stations had been chosen and caches of rations for the working parties, forage for the animals, and a year's supply for three men and one dog team, which was to form the detachment at each telegraph station, had been carried to each cache.

The final run down the Tanana started on May 31, it being necessary to reach Salcha before June 30, as the appropriation for the work ran out at that time. This was a distance of 65 miles from the end of our line to where the other party was working at that time. The work went forward rapidly, every man doing his utmost in spite of the obstacles which presented themselves. Our meat ran out, but we obtained caribou and bear meat. The mosquitoes in the Tanana swamps were nearly intolerable for both the men and the animals, it being necessary to build long smoky fires to keep them away. The animals, especially the horses, would have to be driven away from these fires to make them feed. Great care had to be taken to get the boats safely through Bates Rapids on the Tanana, because if the boats were capsized and the rations and equipment lost the completion of the line would have been delayed for a year. I accordingly took the boats through the difficult places personally, and nothing was lost. One boat had been previously capsized on the Goodpasture and over a ton of rations sunk, which was a serious thing, as no more could be obtained until winter again set in, due to the impossibility of packing for such a distance from Fort Egbert during the summer. We worked steadily on, however, gradually overcoming the obstacles in our way. When one-half the distance between Goodpasture and Salcha was completed, a forest fire caused by Indians and prospectors began to creep up the Tanana, and by June 10 was over 250 miles long, following the north bank of the river, and directly in our path. From that time until the completion of the line the men worked directly through the fire, in some places the wire being taken through the smoking embers by a man riding at a gallop on a mule.

On June 27, 1903, we made the final connection, and the Alaskan telegraph system was completed, comprising, with all the lines in the territory, nearly 2,000 miles of wire.

As General Greely, the Chief Signal Officer of the Army, has said: "Never have enlisted men shown greater aptitude and attention to duty than in the construction of these lines through the extreme cold and snow of the winters and the bogs, morasses, woods, and mosquitoes of the summer time, and with these conditions prevailing in an extremely rough and little-known country, which many people believed to be impossible for a telegraph line to be put in." As it was, the work could not have been accomplished had not the Chief Signal Officer, General Greely, directing and knowing each detail of the work, given the men engaged in it the support and encouragement which he did.

THE FISHERIES OF JAPAN

By Hugh M. Smith, of the Bureau of Fisheries *

JAPAN is today the leading fishing nation in the world. Probably in no other country has the sea played a greater part in the material and sentimental development of a people. With only a limited area available for agriculture, fish early became a great food staple. Every day in the year every Japanese family has some form of fish food. As conducted by the Japanese, fishing is more than an industry—it is a fine art. Centuries ago Japanese fisheries had attained great importance. Some of their fishing literature goes back a thousand years.

For weeks at a time I was away from towns which possessed a European hotel, and I lived at Japanese inns in strictly native style, sleeping on the floor, receiving callers while kneeling on the floor, and eating while sitting cross-legged before miniature tables, my wants supplied by more polite waitresses than one ever meets in any other land. A typical Japanese meal abounds in products of the water, and is replete with surprises to the unsophisticated foreigner. This is particularly true of the smaller fishing villages, where I passed many days.

When it comes to eating water products, the Japanese have few prejudices. If they discard any species of fish, these must be very few indeed, and I did not learn of any. Among their commonest, cheapest, and most wholesome food fishes are sharks, which are brought into the markets and butchered much after the manner of beeves in our own country. Raw fish is one of the national foods. I acknowledge that my repugnance to it was great, but was overcome by the first dish, for, as prepared and served by the Japanese, the thin, cold, boneless slices of perfectly fresh mackerel, taken with chop sticks and dipped in, say, bean sauce, are delicious.

Other articles which I have eaten at a single full course are fish, soup, fried fish, baked fish, fried eels and rice, pickled eggs of sea urchins, dry octopus or squid, boiled abalone, see-weed jelly, and shredded whale cartilage pickled.

For some reason we do not knowingly eat sharks, and in this we miss a good deal. As some people are doubtless aware, the dogfish, which appear in such immense droves on our east coast and are so destructive of other fish life, are excellent when fresh or canned, and I predict that the day will come when these and other sharks will be regularly seen in our markets

In asserting that Japan is the leading fishing nation, I am, of course, aware that its fisheries are exceeded in value by those of two or three other countries, but Japan is preëminent in the actual number of people making a livelihood in this way; in the proportion of persons engaged in fishing of the total population; in the relative importance of fishing products in the domestic economy; in the ingenuity and skill shown by the people in devising fishing appliances and in preparing fishing products; in the extent to which all kinds of water products are utilized; in the zeal displayed by the government in promoting the interests of the fishing population.

The annual value of the water products is now about $30,000,000. The fishing vessels and boats number nearly 500,000, of which about 18,000 are more than 30 feet long and 85,000 more exceed 18 feet. One-twentieth of the entire population are fishermen. The latest figures available give 940,000 professionals and 1,400,000 who devote a part

* Courtesy of Boston *Evening Transcript.*

of their time to fishing and the rest to agriculture or other pursuits, a total of 2,340,000 as against 150,000 in the United States.

The factors which underlie Japan's dependence on fish are varied. The ingenuity and industry of the race, and the spirit of frugality which compels the saving of every product of the water, are prominent. Geographical features have been potent in developing the fisheries, the numerous islands and the great length of the coast line bringing a large part of the population within easy reach of the sea. There are few places in the entire empire where fresh fish may not be had daily, and this, too, without the aid of railroads or ice. This extension of the empire diagonally through 35 degrees of latitude and 38 degrees of longitude is accompanied by a wonderful variety of water life. One thousand species of fishes are already known, and the other classes of sea life are correspondingly well represented. To all of this is to be added a great abundance of most useful products, some peculiar to the inshore waters, and other high-sea species which come close to the coast in immense schools and are perpetually renewed, owing to the presence of water several thousand fathoms deep within a few miles of the mainland.

To the attitude of the government must be attributed no small share in the development of the fisheries. Since the restoration the control of the industry has been vested largely in the central government, and everything has been done that the most enlightened civilization could require to promote the welfare of the fishermen and the growth of their business. With characteristic progressiveness, officials have been sent to America and other countries to study fishing and fish culture, and the best methods of foreign lands have been adopted by the Japanese, as far as applicable to local conditions. The Imperial Fisheries Bureau, a branch of the Department of Agriculture and Commerce, is splendidly organized and ably administered by specialists in biology, fish culture, economic fisheries. The work is conducted on modern lines, with great stress laid on scientific investigation as the basis of fishery legislation and promotion.

The imperial government and the various local governments fully appreciate the importance of experimental and biological stations, and many of these have been established and are now doing excellent work. Most of the stations or laboratories are completely equipped with canning apparatus, and experiments are constantly in progress to develop methods of preserving all kinds of fish products to better advantage than now.

An institution to which the Japanese can point with great pride is the Imperial Fisheries Institute, in the outskirts of Tokyo, on Tokyo Bay. I gave a talk before the faculty and students of the institute on our fishery work in the United States. After I had been shown about the place and seen something of the equipment and methods, I was completely overwhelmed and had no hesitation in announcing that no other country possessed an institution which could compare with this one in comprehensiveness of curriculum, thoroughness of instruction, and completeness of equipment. The plant covers nearly nine acres, of which the dock occupies one and a half acres and the buildings more than two acres. The work extends through three years and comprises three courses, any one of which may be selected for special study by students in their third year, each course occupying ten full months.

The department of fishing includes the following subjects in its regular curriculum: Methods of fishing, navigation, seamanship, shipbuilding, meteorology, oceanography, applied mechanics, applied zoölogy, applied botany,

mathematics, law, economics, bookkeeping, elementary fisheries, technology, and English. The department of fisheries technology has special instruction in marine food products, marine industrial products, bacteriology, applied mechanics, industrial chemistry, chemical mechanics, applied zoölogy, applied botany, law, economics, bookkeeping, and English. In the department of pisciculture the subjects are fresh-water culture, salt-water culture, protection of fish, embryology, bacteriology, oceanography, chemistry, applied zoölogy, applied botany, law, economics, book-keeping, and English. Provision is made for postgraduate investigations and for various special technical inquiries. The institute has an annual income from the government amounting to $70,000. Its numerous graduates obtain excellent positions as directors of fishing, fish curing, and fishcultural establishments. The Japanese Fisheries Society deserves mention. It was organized about twenty-five years ago, and has done excellent work directly and in coöperation with the government. It publishes a monthly journal, and has 4,979 members.

While the Japanese high-sea fisheries (cod, whales, halibut, fur seals) are important, as are the river and lake resources, it is the shore fisheries alone that give to Japan its unique position as a fishing nation.

Of the most valuable products, many are identical with ours. The principal difference in the fisheries of the two countries is the relative extent to which particular species are utilized. Herring is the king of fishes in Japan, just as it is in some European countries and in the world, considered as a whole. This fish is worth $4,000,000 yearly to the Japanese, and is particularly abundant in the northern provinces. Next in importance comes the sardine, valued at $3,700,000; it is extensively canned, and is also eaten fresh and sun dried. Their bonito, very similar to ours, ranks third in value, the annual sales being $2,000,000. It is prepared in a peculiar way, and is always kept on hand as an emergency ration in Japanese houses. A fish similar to our scup or red snapper, and known as "tai," is the favorite for fresh consumption, and is worth about $2,000,000 yearly. Other prominent products are mackerel, valued at $1,000,000; tunny or horse mackerel, $900,000; amber fish or yellow tail, $1,000,000; squid and cuttle fish, $1,500,000; anchovies, $800,000; prawn, $700,000, and salmon, $600,000.

The Japanese have no fisheries comparable with our shad, alewife, menhaden, striped bass, white fish, pike, perch, lake trout, soft crabs, sponge, and lobster. Their oyster and clam fisheries are insignificant by comparison with ours, and so, too, are their salmon, mullet, cod, and halibut. On the other hand, our herrings, sardine, anchovy, yellow tail, tunny, squid, prawn, abalone, shark, and bonito and seaweed fisheries are trivial compared with theirs, and we have no cuttle fish, sea cucumber, or coral fisheries. The recent growth of the Japanese coral industry has been marked, and the Mediterranean corals, which for centuries have monopolized the world's markets, have already taken second place. Much of the Italian output of coral ornaments is now made from imported Japanese raw products.

WHAT THE U. S. GEOLOGICAL SURVEY HAS DONE IN TWENTY-FIVE YEARS

IN commemoration of the twenty-fifth anniversary of the formation of the U. S. Geological Survey, the Survey has published a small volume giving an account of the origin, development, and present organization of the Survey, with short summaries of its various operations during the first quarter century of its existence. Among the more important results achieved by the organization are the following :

A complete topographic map of 929,850 square miles of the area of the United States, which, including Alaska, amounts to 3,622,933 square miles. In other words, the Survey has finished the mapping, on more or less detailed scales, of 26 per cent of the area of the country including Alaska, and 31 per cent excluding Alaska.

This map is published in the form of 1,327 separate atlas sheets, printed in three colors from copper-plate engravings. The topographic maps of the Geological Survey have greatly expedited investigations by cities of their water supply, and have been of the highest value to railway companies and state highway bureaus in designing and planning their projects. The improvement of highways in New York, Maryland, Massachusetts, and other states has been greatly facilitated and the cost of the state work materially reduced by these maps. The elaborate and valuable reports recently completed on the future water supply of the city of New York and on the New York State Barge Canal have been rendered conclusive in large measure only through the agency of the existing topographic maps.

Many of the broader problems whose solution must necessarily precede the final geologic mapping of the country have been solved. The geologic mapping of the surface formations has been extended over about 171,000 square miles, and 106 geologic folios have been published, while nearly an equal number are in various stages of preparation. These folios consist of descriptive text, a topographic sheet, geologic sheets for areal and economic geology, structure sections, columnar sections, etc. Each folio thus presents a practically complete history of the topography, geology, and mineral resources of the area described.

Coincident with the geologic work, important experiments and investigations into the physical characteristics of rocks in various processes of formation, and of volcanic and geyser action, have been conducted in the physical laboratory, and many important conclusions have been reached. The chemical laboratory and the petrographic laboratory have been engaged in solving, chemically and microscopically, the more important problems connected with rock composition and structure, while the paleontologic section has aided in solving stratigraphic and structural problems by the classification and identification of the fossil remains of plants and animals.

The engraving and printing division has engraved 1,421 series of copper plates for as many topographic atlas sheets, each series consisting of three plates, one for each color. It has lithographed on stone the colors, ranging in number from 10 to nearly 30, necessary for distinguishing in each of about 100 geologic folios the various formations and outcrops. It has printed several editions of most of the topographic maps and at least one edition of the geologic folios, besides revising both as occasion therefor has arisen, and engraving and printing miscellaneous state and United States maps.

The hydrographic branch, including the reclamation service, has recorded during the last 15 years the maximum, minimum, and mean discharges of all the more important rivers, and for

shorter periods the same facts concerning all the lesser tributaries of the many hundreds of streams in the United States. These results have been assembled and studied, and the flow of the streams has been compared with the precipitation as shown by the records of the Weather Bureau. The physical characteristics of the river basins have been studied in respect to their forestation, soil covering, etc., and there has been accumulated a vast amount of data from which it is possible to estimate closely the volume or run-off of each of the streams. The development of the water powers of the country, especially in the Southern States, has received a great impetus in the last few years through the facts brought to light by the hydrographic branch in respect to the volume and regularity of the discharge of and the amount of fall in the various streams of the country. Many unknown water powers have been found, and projects already commenced have had their value or their defects made manifest through the evidence resulting from the surveys of this branch. Data have been gathered concerning the public lands which are irrigable and their relation to possible water supplies. A large number of reservoir sites have been examined and surveyed in a preliminary way, and the lands withdrawn from sale or occupation pending more detailed studies. A number of these reservoir and irrigation projects have been studied in greater detail, surveys of the irrigable lands, as well as of canal lines, have been made, and some have been finally approved for construction by the reclamation service.

The division of geography and forestry has made detailed examinations of 110,000 square miles, including a classification of the lands, as forested (with stand and kind of timber), grazing, desert, and cultivable, and has prepared final reports on these reserves, showing the character and amount of the timber and many other facts which will serve as a basis for the future forest management of these properties.

Perhaps the immediate value to the people of the work of the Geological Survey is best shown by the aid it extends in developing the mineral resources and in forwarding important engineering projects in which the people, as well as the state and federal governments, are interested. To instance a few cases: The work of the geologic branch has had a wide educational influence upon the public at large, but more directly upon those engaged in the mining industry. Among the many direct practical benefits which it has conferred upon this industry may be mentioned the investigation of the mining geology of Leadville, which has not only guided exploration and secured economical mining in a district that has produced between $200,000,000 and $300,000,000, but has been of even more beneficial result in teaching the mining engineer and the miner the practical importance of geologic study in carrying on the work. In other words, it has greatly improved mining methods throughout the whole country. The investigation of the origin and geologic relations of the Lake Superior iron ores and the publication of numerous reports on that region have so effectively directed the prospector in the discovery of the deposits and the miner in economical methods of development that this region now leads the world in the production of iron ore. The detailed areal mapping and the determination of underground structure in the Appalachian coal fields are placing the development of its coal, petroleum, and gas resources upon a scientific basis and relieving these branches of the mineral industry of a large part of the hazard and uncertainty which has always hitherto been associated with them. The collection and publication of reliable statistics of mineral production have furnished a sound commercial basis for all branches of the mineral industry.

COLOSSAL NATURAL BRIDGES OF UTAH

THREE gigantic bridges, greatly surpassing the great Natural Bridge of Virginia, have recently been discovered at the head of White Canyon, in San Juan county, Utah. They are described in the *Century Magazine* for August by W. W. Dyar, and the magazine also publishes several photographs of them and a remarkable colored picture of the largest bridge. The bridges are many miles from the railway, and, it is said, can be reached only during the spring of the year, as lack of water makes the region inaccessible except during the early months. In March, 1903, Mr Horace J. Long, a mining engineer, conducted by a cattleman named Scorup, who had caught a distant glimpse of the bridges in 1895 and had desired to examine them ever since, entered White Canyon at a point two days' march from Dandy Crossing, on the Colorado River. They ascended the canyon for several miles, passing numerous ancient cliff dwellings, until they had their first sight of the first of the great bridges.

"The travelers had with them no scientific instruments for making accurate measurements, but by a series of rough triangulations Long obtained results which are doubtless correct within narrow limits. The first bridge, which they named the Caroline (in honor of Mr Scorup's wife), measures two hundred and eight feet six inches from buttress to buttress across the bottom of the canyon. From the surface of the water to the center of the arch above is a sheer height of one hundred and ninety-seven feet, and over the arch at its highest point the solid mass of sandstone rises one hundred and twenty-five feet farther to the level floor of the bridge. A traveler crossing the canyon by this titanic masonry would thus pass three hundred and twenty-two feet above the bed of the stream. The floor of the bridge is one hundred and twenty-seven feet wide, so that an army could march over it in columns of companies, and still leave room at the side for a continuous stream of artillery and baggage wagons."

The second bridge is about 3½ miles farther up the canyon. Its "height is more than twice and its span more than three times as great as those of the famous Natural Bridge of Virginia. Its buttresses are 118 feet farther apart than those of the celebrated masonry arch in Maryland, known as Cabin John Bridge, a few miles from Washington city, which has the greatest span of any masonry bridge on this continent. This bridge would overspan the Capitol at Washington, and clear the top of the dome by 51 feet; and if the loftiest tree in the Calaveras grove of giant sequoia in California stood in the bottom of the canyon, its topmost bough would lack 32 feet of reaching the under side of the arch.

"Emulating the example of Mr Scorup, Long named this bridge the "Augusta," in honor of his wife, and it is fortunate that the lady was so appropriately christened.

"This bridge is of white or very light sandstone, and, as in the case of the Caroline, filaments of green and orange-tinted lichens run here and there over the mighty buttresses and along the sheltered crevices under the lofty cornice, giving warmth and color to the wonderful picture.

"Our explorers were unable to scale the walls of the canyon in the immediate neighborhood of either of these two bridges, and their time was too limited to permit an extended search for a ravine or wash that would lead them to the top of the cliffs."

About 12 miles down the canyon is the third bridge. "Long, in his rough notes of the trip, calls this the 'Little Bridge,' and we may well retain this

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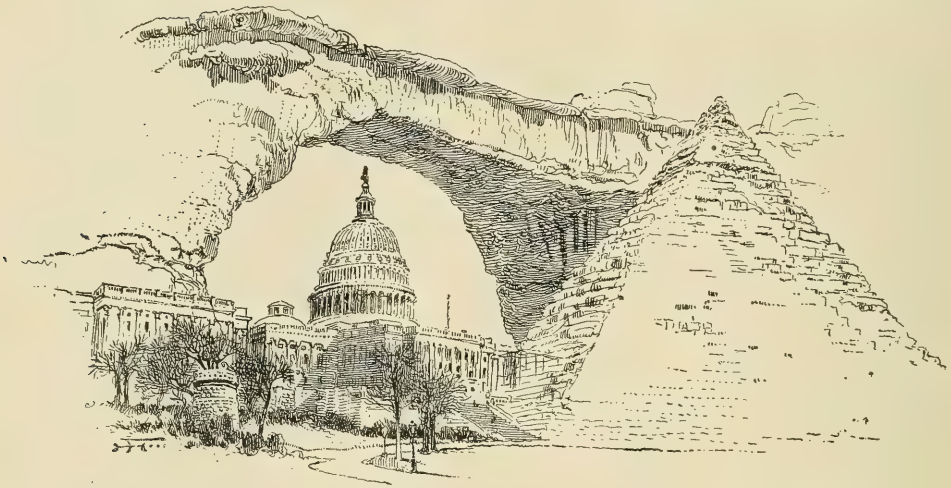

The Augusta Natural Bridge (see page 367), Compared with the Capitol at Washington and the Great Pyramid.

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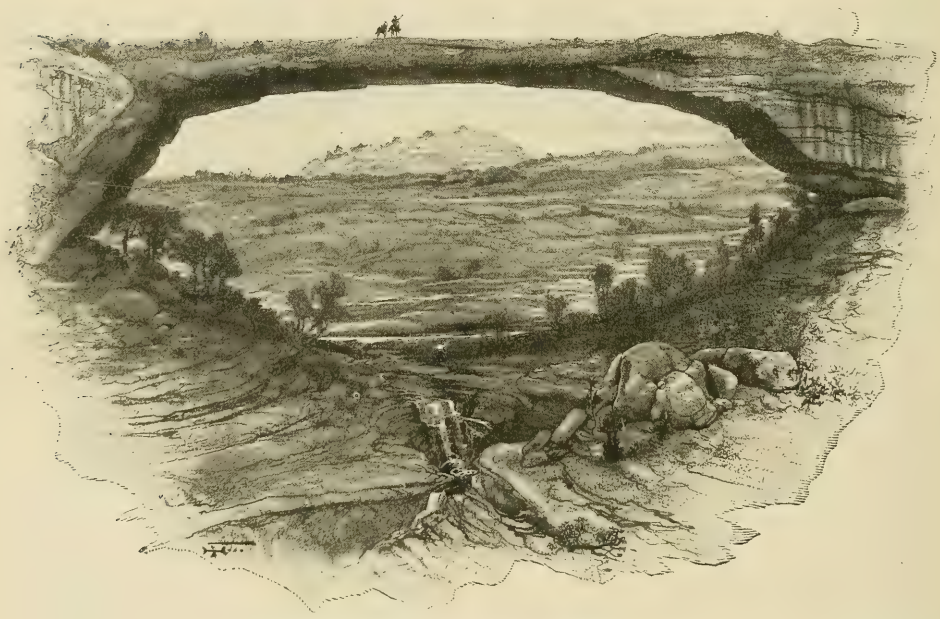


Half-tone plate engraved by J. W. Evans. Courtesy of the Century Magazine

The Little Bridge

designation. Its dimensions, however, are small only as compared with the gigantic proportions of the Caroline and the Augusta, for it has a span of 211 feet 4 inches, and the under side of the arch is 142 feet above the bottom of the canyon. The crown of the arch is 18 feet 8 inches thick, and the surface or roadway 33 feet 5 inches wide. The slenderness of this aerial pathway and the fact that the canyon here opens out into a sloping valley beyond rendered it possible for the camera to give a proper impression of loftiness. Indeed, judging from the photographs alone, one might suppose this to be the highest of the three bridges, whereas in fact it has but little more than one-third the altitude of the wonderful Augusta arch. It was comparatively easy to reach the top of this bridge, and among Long's notes I find the following: 'Rode our horses over. I am the first white man who has ever ridden over this bridge.'"

GAZETTEERS OF THE STATES

A SERIES of useful gazetteers of the different states is being published by the U. S. Geological Survey. Within the past month there have appeared four bulletins in the series—gazetteers of Virginia, Maryland, Delaware, and Texas—each prepared by Mr. Henry Gannett. Each bulletin, handsomely illustrated, gives a brief description of every geographical feature in the state, and, as an introductory chapter, a general description of the state.

Virginia was one of the first states of the Union to be settled. At the time of the first census, taken in 1790, it had a population of nearly three-fourths of a million and was the most densely inhabited of all the states. In 1900, with a population of 1,854,184, it was the seventeenth state in number of inhabitants. Of the total population, only 14.6 per cent were found in cities and the remaining 85.4 per cent were classed as rural. This proportion of rural population is much greater than that of the country at large. Another interesting fact in connection with the population is the statement that the white race increased in the decade between 1890 and 1900 at the rate of 16.9 per cent, while the negroes increased at the rate of only 4 per cent. This small rate of increase among the negroes is certainly not due to any falling off in natural increase, but indicates a movement of the negro population away from the state, probably southward.

Virginia is preëminently an agricultural state. The total area of farms in 1900 was 19,907,883 acres, but the average size of the farms was only 118.6 acres, which is considerably less than the size of the average farm of the United States. Tobacco is the most important of Virginia's agricultural products. Kentucky and North Carolina are the only states that exceed Virginia in the production of that important weed.

As a manufacturing state, Virginia does not take high rank; but in view of her rich deposits of excellent coking coal and iron it is probable that her manufactures will greatly increase. The coal production in 1901 was 2,725,873 short tons, and the amount of coke produced was 907,130 short tons. In that same year 448,662 long tons of pig iron were smelted within the state. Manganese ore to the amount of 4,275 tons was mined.

Maryland was one of the thirteen original states, and has the distinction of having ceded to the general government, as the site of a capital, an area of

about 70 square miles, which constitutes the present District of Columbia.

In 1730 Maryland was the sixth state in the Union in population. In 1900, although its inhabitants were 3.7 times as numerous, it had dropped to the twenty-sixth in rank. This was due to the rapid growth of the newer states in the Mississippi Valley. It now has five cities which exceed 6,000 inhabitants. Baltimore has over half a million; Cumberland, 17,128; Hagerstown, 13,591; Frederick, 9,296, and Annapolis, the capital, 8,525. These five cities contain 46.9 per cent of the population of the entire state, which amounted to 1,188,044 in 1900. This population is divided almost equally between males and females. The negro population, which constitutes about one-fifth of the whole, is diminishing in proportion to the whites. The number of foreign-born inhabitants is also small, the persons of native birth forming 92.1 per cent of the entire population.

For a state containing so large a proportion of negroes, the illiteracy is slight. In 1900 persons 10 years of age and over who were unable to read and write constituted 11.1 per cent of the population.

Agriculture is one of the leading occupations. In 1900 the state contained 46,021 farms, of which seven-eighths were occupied by white farmers and one-eighth by negro farmers. The average size of the farms was 112.4 acres, which is considerable less than the average for the United States. The total value of all the farms was $204,645,407, and the product amounted to 21 per cent of the value of the farms, and may be regarded as the farming profit. In the production of tobacco Maryland is the eighth state in the Union.

In manufactures Maryland is the fourteenth state in the Union. Two-thirds of the manufactures are carried on in the city of Baltimore.

The principal and almost sole mineral product of the state is a bituminous coal of excellent quality, mined in the neighborhood of Cumberland. In 1901 the amount mined was 5,113,127 tons.

A NOTABLE NORWEGIAN PUBLICATION

THE people of Norway are one of the most interesting and unique of old Europe. Although such a small nation, numbering only 2,230,000, they hold a very important place in the world, thanks to their writers and scholars. In proportion to its inhabitants Norway has more men celebrated for their achievements than any other nation. In literature there is the poet Björnstjern Björnson and the dramatist Ibsen, whose works are admired both in America and in Europe; in the sciences the celebrated Nansen and such men as Sars, Moln, and Brögger, whose achievements specialists universally recognize.

Not only because of its famous men has this little nation won the attention of the world, but also because of its own marked individuality. The Norwegians have a wonderful spirit of initiative, resembling Americans in this respect, and they also show a very striking taste for the study and observation of natural phenomena. During the long northern winter, shut in by snow and ice, the peasants spend their time in reading, and reading especially works of science; the naturalist who explores Norway is struck on every side by the intelligent interest shown in his researches.

The Norwegians have just shown a new proof of their love and pride in their country. A group of eminent scholars in Christiania conceived the idea of publishing a great work which should give

a faithful description of Norway and set forth the results accomplished by Norwegians in every branch of human activity since the establishment of the independent monarchy (1814). This work, "Norge I det Nittende Aarhundrede" (Norway in the XIX Century), illustrated by the best Norwegian artists, costs $16.00, a high price in a country of moderate means. The market for this Norwegian library is necessarily small, but the publication, although started with an entirely disinterested object in view, has paid for itself. From one end of the country to the other all classes of people have helped with their subscriptions to erect this literary monument to science and to the glory of their country. The Norwegian language offers little difficulty to English-speaking people, and "Norge I det Nittende Aarhundrede" deserves to be brought to the attention of American geographers as a work of highest rank. It consists of a series of very complete monographs on the geography, geology, history, ethnography, and varied industries of Norway, all edited by the most eminent specialists. The work contains a mass of facts which it would be very difficult to find anywhere else, and is one of the most important works on general geography that has appeared since the beginning of the twentieth century.

CHARLES RABOT.

Paris.

BOOKS RECEIVED

Dodge's Elementary Geography. Part 1, Home Geography; Part 2, World Relations and the Continents. By Richard Elwood Dodge. Pp. 231. 8 by 10 inches. Chicago: Rand, McNally & Co. 1904. $0.75.

Philippine Islands. By Emma Helen Blair and James Alexander Robertson. Vol. XVI. Pp. 330. 6 by 9½ inches. Cleveland, Ohio: Arthur H. Clarke Co. 1904.

The Philippine Islands. Report of the Philippine Commission for 1903. 3 vols, large octavo. Washington: Government Printing Office. 1904.

Les Lois de la Geographie. By Carlos De Mello. Pp. 360. 6 by 9½ inches. Berlin: R. Friedlander & Sohn. 1902.

Early Western Travels. 1748 to 1846. By R. G. Thwaites, LL. D. Vols. IV, V, VI. Pp. 400. 6½ by 9½ inches. Cleveland, Ohio: Arthur H. Clarke Co. 1904.

Introduction of Domestic Reindeer into Alaska. With map and illustrations. By Sheldon Jackson. Pp. 192. 6 by 9½ inches. Washington, D. C.: Government Printing Office. 1904.

North America. By Israel C. Russell. Maps and diagrams. Pp. 434. 6 by 9 inches. New York: D. Appleton & Co. 1904.

Year Book of the U. S. Department of Agriculture. Illustrated. Pp. 628. 6 by 9 inches. Washington, D.C.: Government Printing Office. 1904.

Glaciers of Alaska. By George Davidson. Pp. 98. 6½ by 10 inches. San Francisco: Geographical Society of the Pacific. 1904.

RECENT GOVERNMENT REPORTS

Census of the Philippine Islands, 1903, Gen. J. P. Sanger, Director; Henry Gannett, V. H. Olmsted, Assistant Directors. Bulletin I. Population. Bulletin II. Climate, by S. J. Celqué. Bulletin III. Volcanoes and Seismic Disturbances, by M. S. Maso. Bureau of the Census.

Planting of White Pine in New England, H. B. Kempton. Bureau of Forestry.

Forest Resources of Texas, William L. Bray. Bureau of Forestry.

Forests of the Hawaiian Islands, William L. Hall. Bureau of Forestry.

The Date Palm and Its Utilization in the Southwestern States, Walter T. Swingle. Bureau of Plant Industry.

The Clays of the United States East of the Mississippi, Heinrich Ries. U. S. Geological Survey.

The Carboniferous Formations and Faunas of Colorado, George H. Girty. U. S. Geological Survey.

Turtle Mountain and the Great Rock-slide at Frank, Alta, Looking Northward

At dawn on April 29, 1903, a huge rock mass, nearly half a mile square and probably 400 to 500 feet thick in places, suddenly broke loose from the east face of Turtle Mountain and precipitated itself with terrific violence into the valley beneath, overwhelming everything in its course. The great mass, urged forward by the momentum acquired in its descent and broken into innumerable fragments, plowed through the bed of Old Man River, and, carrying both water and underlying sediments along with it, crossed the valley and hurled itself against and up the opposite terraced slopes to a height of 400 feet. Blocks of limestones and shale, mingled with mud, now cover the valley to a depth of from 3 to probably 150 feet, over an area of 1.03 square miles. A rough estimate of the size of the mass which broke away, obtained by comparison of the old and new contours of the mountain itself, is about 40,702,000 cubic yards, or 90,796,000 tons. The Frank slide was a "Bergsturz," a breaking away of the mountain mass across the bedding planes. The cavity left by the breaking away of the central peak and the course of the slide can be distinctly seen. Under the slide-rock the terraced floor of the valley is discernible. The uneven, billowed surface of the slide-rock is well shown, and the heaped-up rim along the edges of the slide can be seen at several points. In the foreground is a thin promontory of débris deflected from the main course of the slide. The town lies on the farther side of the slide in the direction of the gap between the mountains. A special report on this great slide has been recently published by the Department of Interior, at Ottawa.

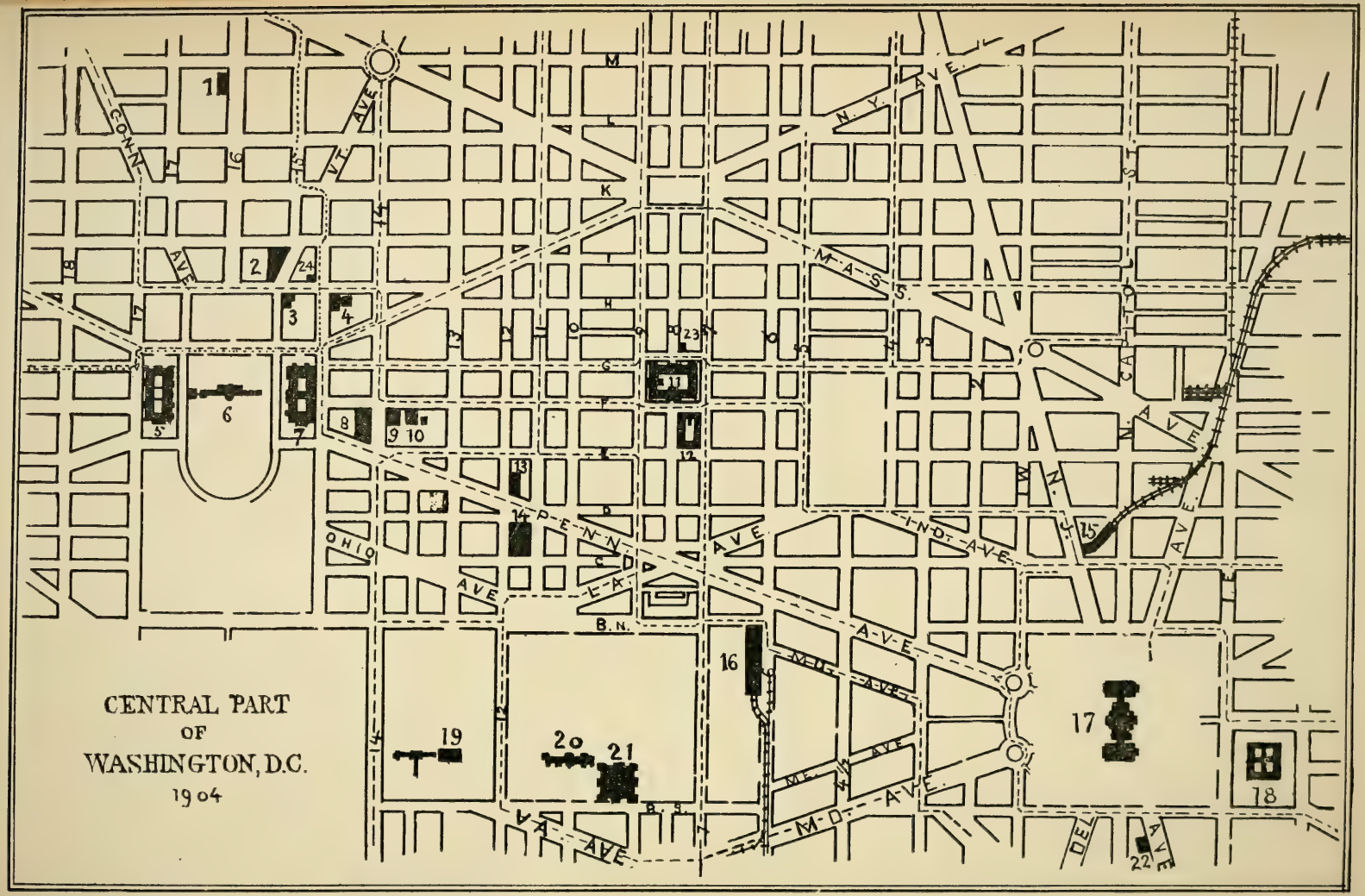
PROGRAM OF

EIGHTH

International Geographic Congress

HELD AT

WASHINGTON, D. C.



1 Hubbard Memorial Hall
2 Arlington Hotel
3 Cosmos Club
4 George Washington (Columbian) University
5 State, War, and Navy Departments
6 White House
7 Treasury Department
8 Willard Hotel
9 Ebbitt House (**Headquarters**)
10 Geological Survey
11 Interior Department
12 General Land Office
13 Raleigh Hotel
14 Post Office Department
15 Baltimore and Ohio Railroad Depot
16 Pennsylvania Railroad Depot
17 Capitol
18 Library of Congress
19 Department of Agriculture
20 Smithsonian Institution
21 National Museum
22 Coast and Geodetic Survey
23 Bureau of Education
24 Shoreham

GENERAL PROGRAM OF THE EIGHTH INTERNATIONAL GEOGRAPHIC CONGRESS

WASHINGTON, D. C., THURSDAY, SEPTEMBER 8, 1904

THE Eighth International Geographic Congress will differ from all previous Congresses, in that sessions will be held in several cities instead of one, as heretofore.

The times and places of convening are as follows :

Wednesday, September 7.—Informal reception at Hubbard Memorial Hall by National Geographic Society.

Thursday September 8.—Formal opening of Congress at 10 o'clock.

Friday, September 9.—General and Sectional Meetings.

Saturday, September 10.—General and Sectional Meetings.

Sunday, September 11.—Field Meeting on Potomac River, followed by trip to Philadelphia, train leaving at 7 p. m.

Monday, September 12.—Meeting under auspices of Geographical Society of Philadelphia.

Tuesday, September 13.—Sessions in New York under auspices of American Geographical Society.

Wednesday September 14.—Sessions in New York under auspices of American Geographical Society.

Thursday, September 15.—Field Meeting on Hudson River.

Friday, September 16.—Field Meeting, Niagara Falls.

Saturday, September 17.—Sessions in Chicago under auspices of Geographic Society of Chicago.

Sunday, September 18.—Field Meeting.

Monday, September 19, to Wednesday, September 21. — Meetings in St Louis in conjunction with Congress of Arts and Sciences.

For the information of the members of the Congress visiting Washington and not acquainted with the city, a map of that portion of the city containing the places of special interest is printed on preceding page.

The accompanying information will also be of use to the visitors :

HEADQUARTERS

Until September 7 the office of the Congress will be in Hubbard Memorial Hall (the home of the National Geographic Society), corner Sixteenth and M streets northwest, Washington, D.C. (No. 1 on map). On Wednesday morning, September 7, the records will be transferred to the Ebbitt House (No. 9 on map), Fourteenth and F streets northwest. This hotel will remain the headquarters during the stay of the Congress in Washington, and the secretaries will be in constant attendance for registering members, supplying badges, furnishing information, etc.

The headquarters can be reached by street cars, which run from the depots to the Ebbitt House.

On September 12 an office for registration will be opened in the headquarters of the Geographical Society of Philadelphia, 1520 Chestnut street, Philadelphia, Pennsylvania.

On the morning of the 13th an office for registration will be opened in New York, at the American Geographical Society building, 15 West Eighty-first street, which will be the headquarters of the Congress during its stay in New York.

On September 17 a registration office will be opened in Cobb Hall of the University of Chicago, Chicago, Illinois

On the morning of September 19 a registration office will be located in the Hall of Congresses on the Exposition grounds in St. Louis. On Saturday, September 24, the records will be transferred to Hubbard Memorial Hall, Washington, where the office will be retained and whither all correspondence should be directed until the final closing of the affairs of the Eighth International Geographic Congress.

REGISTRATION

Delegates, members, associates, and persons desiring to become members are requested to register on the earliest possible date at the local headquarters in the city in which they first attend the Congress. Those who participate in the Washington sessions are especially desired promptly to record their names and local addresses in order to facilitate the preparation of lists of membership and the delivery of mail. Immediately on registering, members of the Congress will receive the official badge entitling them to the privileges of the Congress and to the courtesies extended to members by local committees.

On September 7 will be issued a list of all members registered to that date. Those marked + are present at the Congress, and their local addresses will be given. To facilitate the identification of members each one registered will be furnished a small button numbered to correspond with his membership ticket. To identify a member it is only necessary to look in the list at the name opposite the number on his button.

An alphabetic list will also be given, with the number of the ticket opposite each name, in order that members may ascertain if a particular person is a member of the Congress or is in attendance upon its sessions.

Members and delegates of foreign geographic societies are requested to see that their respective societies are registered and the cards for permanent record filled out.

HOTELS

In Washington the hotels recommended are as follows:

The Ebbitt House (headquarters), Fourteenth and F streets; American plan; $3.00 and $4.00 per day. (No. 9 on map.)

The New Willard, across the street from the Ebbitt House (headquarters), three squares south of meeting place; European plan; $2.50 per day and upward. (No. 8 on map.)

The Raleigh, Twelfth street and Pennsylvania avenue; European plan; $2.00 per day and upward. (No. 13 on map.)

The Arlington, one block west of meeting place; American plan; $5.00 per day. (No. 2 on map.)

The Shoreham, across the street from meeting place; European plan; $2.00 and $3.00 per day. (No. 24 on map.)

The Colonial, across the street from meeting place; European plan; $1.50 per day. (Opposite No. 4 on map.)

Members preferring private or boarding houses to hotels can be accommodated at reasonable rates by communicating in advance with the secretary of the Committee of Arrangements.

Each of the above hotels can be reached by street cars.

BAGGAGE

Members arriving at either the Pennsylvania or the Baltimore and Ohio station can check baggage to their hotel at the Union Transfer Company's stand, the regular fee being 25 cents for each piece.

The Union Transfer Company (telephone number, Main 1610) will call for and check baggage from hotels and residences to destination.

Members can also have their baggage delivered for a fee of 25 cents by leav-

ing their checks at the headquarters, Ebbitt House.

CAB SERVICE

The Pennsylvania Railroad operates a cab-service system, the main office being at the Pennsylvania Railroad station, Sixth and B streets northwest (telephone, main 1640). The rates follow:

By the Trip

One and a half miles or less, direct to or from station to one address, one person, 25 cents.

Each additional person, 25 cents.

Each additional address, one or two persons, 25 cents.

Each additional address, more than two persons, each person, 10 cents.

Each additional half mile or less, each person, 10 cents.

On Call, to go to Station

To call at any address within 1½ miles of Sixth Street station, one person, 25 cents.

Each additional person, 25 cents.

Each additional half mile or less, each person, 10 cents.

By the Hour

One or two persons, first hour or less, 75 cents.

Three or four persons, $1.00.

Each additional quarter hour or less, one or two persons, 20 cents.

Three or four persons, 25 cents.

STREET CARS

Street-car lines charge 5 cents within city limits, or 6 tickets for 25 cents, and free transfers are given to branch lines. If transfer to another branch is desired, ask for the transfer when the fare is paid.

Visitors desiring to see Washington can also take the "Seeing Washington Car." Tickets can be obtained at headquaters at a special rate, to members and associates of the Congress, of 40 cents for regular trips. Arrangements for special parties can be made at headquarters.

SIGHT-SEEING AUTOMOBILE

Arrangements have been made with the Auto Transit Company for personally conducted tours of the city by means of their Big Red Automobile. This auto goes direct to every point of interest, and is accompanied by a competent lecturer, who gives an accurate account of every point, historic and interesting.

This is perhaps the most comprehensive and comfortable means of seeing all the sights.

Tickets can be purchased at headquarters at 80 cents for the entire trip. This rate is for members of the Congress only.

These trips require about two hours for the round trip, and will afford the visitors a quick way of seeing the residential portion of the city.

TELEGRAPH COMPANIES

Western Union, main office, corner Fourteenth and F streets northwest, opposite headquarters.

Postal, main office, 1345 Pennsylvania avenue northwest.

MESSENGER SERVICE

The Mutual District Messenger Company, main office, 1401 F street northwest.

The Postal Telegraph Cable Company, 1345 Pennsylvania avenue northwest.

PLACES TO SEE

Bureaus of Special Geographic Interest

Geological Survey, 1330 F street.

Weather Bureau, corner of Twenty-fourth and M streets.

Plant Industry Bureau, Department of Agriculture.

Biological Survey, Department of Agriculture.

Census, corner of First and B streets northwest.

Coast and Geodetic Survey, New Jersey avenue southeast near B street.

National Museum, Mall, near Seventh street.

Smithsonian Institution, Mall, near Seventh street.

Observatory, on Georgetown Heights, north of Georgetown.

Hydrographic Office, Navy Department.

Signal Service, War Department.

Bureau of Engineers, War Department.

Information Division, War Department, Lemon Building.

Bureau of Insular Affairs, War Department.

Isthmian Canal Commission, Eleventh street and Pennsylvania avenue.

Navy Yard (gun factory), foot of Eighth street southeast.

Bureau of Forestry, Atlantic Building, 920 F street.

Fish Commission, corner of Sixth and B streets southwest.

Zoölogical Park, Connecticut avenue extended.

Botanic Gardens, First street and Pennsylvania avenue.

Bureau of Standards, New Jersey avenue southeast.

Army Medical Museum, Mall, near Seventh street.

Bureau of American Republics, corner of Jackson place and Pennsylvania avenue.

Carnegie Institution, Bond Building, corner of New York avenue and Fourteenth street.

Bureau of Education, corner of Eighth and G streets northwest.

Bureau of American Ethnology, Adams Building, 1333 F street.

Places of General Interest

Capitol.

Library of Congress.

White House.

Washington Monument.

Bureau of Engraving and Printing.

Government Printing Office.

On account of the limited time given for sightseeing in Washington provision has been made for those who desire to stop off on the return from the western excursion to see the places of interest in the city.

SHORT EXCURSIONS

Some of the most interesting short trips from the city, none consuming more than a few hours, are the following:

Mount Vernon, with the home and tomb of Washington, may be reached by steamer from the Seventh Street wharf, leaving at 10 a. m. and 1.45 p. m. and returning by 1.40 or 5.15 p. m., or by trolley cars, leaving Pennsylvania avenue and Thirteenth-and-a-half street every hour. The round trip, including admission to Mount Vernon, costs 75 cents.

Arlington National Cemetery can be reached by trolley line from Thirteenth-and-a-half street; or by the Georgetown car on Pennsylvania Avenue, across the Aqudeuct bridge, and by trolley from Roslyn.

The Soldiers' Home, a park 3 miles north of the Capitol, is reached by the Seventh or Ninth Street cars.

The National Zoölogical Park is reached by the Connecticut Avenue and Seventh Street lines.

Cabin John Bridge, one of the largest single spans of masonry in the world, 220 feet long and 100 feet above Cabin John Run, is reached by the F Street line, with connection at Georgetown.

POSTAL ARRANGEMENTS

All mail should be addressed care of the Eighth International Geographic Congress, Ebbitt House, Washington, D. C. Members can obtain their mail between 8 a. m. and 7 p. m. by applying at the registration office at headquarters.

USE OF TICKETS

Members and associates are requested to keep their tickets always ready to produce on application. Various publications, some of scientific value, which have been specially prepared for the members of the Congress, will be distributed only to those who are in possession of a ticket.

DAILY PROGRAM

Daily programs will be issued during the meetings in Washington and New York. Any matter designed for incorporation in these must be in the hands of the secretaries by 5 o'clock of the day preceding issue.

COMMUNICATIONS

Following approximately the classification of subjects announced in the preliminary circular, the following sections of the Congress will be organized, and all communications, except such as may be reserved for general sessions, will be made before one or other of these sections:

Section A. Physiography of the land.
Section B. Volcanoes and earthquakes.
Section C. Glaciers.
Section D. Oceanography.
Section E. Meteorology and terrestrial magnetism.
Section F. Bio-geography.
Section G. Anthropo-geography.
Section H. Geodesy and geographic technology.
Section I. Explorations.
Section J. Economic geography and hydrology.
Section K. Educational geography.
Section L. Historical geography.

A special opportunity will be afforded for the discussion of methods of surveying and map-making and for comparison of these methods as pursued in other countries with the work of federal and state surveys maintained in this country.

Delegates and members desiring to present communications before the Congress or wishing to propose subjects for discussion are requested to signify their wishes at the earliest practicable date. It is especially needful that any titles offered hereafter shall be accompanied by abstracts (not exceeding 300 words in length) in order that the Presidency may take prompt action toward introducing the titles and abstracts in the general program to be published at the beginning of the Congress.

The time required for presenting communications should be stated; otherwise twelve minutes will be allotted. It is anticipated that not more than twenty minutes will be allotted for any communication unless the Presidency decides to extend the time by reason of the general interest or importance of the subject.

Titles and abstracts of communications should be submitted to the Secretary of the Congress. Pending the opening of the Congress, the Committee of Arrangements shall decide whether the same are appropriate for incorporation in the program, though the decision of the committee shall be subject to revision by the Presidency after the Congress convenes.

The preliminary announcement, issued in January last, having provided that proposals affecting the organization of the Congress shall be submitted in writing before May 1, any such proposals hereafter received will be laid before the Presidency, who will determine whether they shall receive consideration at the Eighth Congress or be laid over for future action.

COMPTE RENDU

The Presidency, with the aid of a Committee on Publication, will prepare a volume of proceedings or "Compte Rendu," comprising those communications and abstracts which they deem it needful to publish, and this publication will be sent to all members of the

Congress, including societies represented by delegates.

All communications and abstracts submitted for reading or printing shall be deemed the property of the Congress and in every respect subject to the action of the Presidency, although a request for the return of any copy not approved for publication might be entertained at the option of the Presidency.

Authors of communications exceeding seven printed pages in length desiring separates shall order the same (specifying the number) in writing on their manuscript. Such separates will be furnished at cost of press-work, paper, and cover, plus a small percentage (not exceeding 25).

CONTRIBUTIONS OF MEMBERS TO THE FINAL REPORT ON THE CONGRESS

In order to accelerate the publication of the Final Report, all those who have not yet delivered the manuscripts of their papers and communications to the officers of the Congress are requested to place them in the hands of the General Secretary before the close of the meeting. It is also requested that each member who takes part in a discussion will deliver to the secretary of the appropriate section a copy or abstract of his remarks; wherever practicable, in order to avoid error, the papers and reports of discussions should be typewritten.

LANGUAGES OF THE CONGRESS

In order that the geographic societies of the New World may fully utilize the opportunity afforded by this Congress for establishing closer relations with those of the Old World, Spanish will be recognized as one of the languages of the Congress, together with French, English, German, and Italian, in accordance with previous usage. A communication before the Congress may be written in one (or more) of these languages.

THE ITINERARY OF THE CONGRESS

The general announcement contains the itinerary of the Congress and also the rates for transportation. In the daily program to be issued further details will be given concerning these matters. All desired information can be obtained from the Secretary of the Committee of Arrangements at registration headquarters.

In order to provide proper accommodations for those accompanying the Congress on its itinerary, and those participating in the general excursion to Mexico and the western part of the United States, members of the Congress are requested to obtain their tickets, from the Committee of Arrangements, at the earliest possible moment. The secretary of the committee, or his representative, will be at the headquarters, in the Ebbitt House, Wednesday, Thursday, Friday, and Saturday, from 9 a. m. to 7 p. m., for the purpose of affording the members an opportunity of purchasing their tickets, both from Washington to New York and from New York to St. Louis and return. At the same time definite arrangements can be made for those desiring to take the Far West trip.

COSMOS CLUB

The Cosmos Club extends its courtesies to all gentlemen from abroad who are members of the Congress. All other members of the Congress may be introduced by members of the club.

PROGRAM OF WASHINGTON SESSIONS

Wednesday, September 7, at 9 p. m.

Informal reception at Hubbard Memorial Hall, Sixteenth and M streets northwest (No. 1 on map), by the National Geographic Society, to meet the delegates and members and associate members of the Eighth International Geographic Congress.

The object of this informal pre-Congress reception is to afford delegates, members, and associates an opportunity to become acquainted prior to the formal opening of the Congress.

Thursday, September 8

Morning, 10 o'clock.—Formal opening of Congress at the George Washington (Columbian) University Hall, Fifteenth and H streets northwest. (No. 4 on map.)

Afternoon, 2 p. m.—Visits to scientific bureaus, under the guidance of reception committees selected by the respective directors.

Evening, 10 to 12.—Reception at the U. S. Naval Observatory by the Superintendent of the Observatory, Rear Admiral C. M. Chester, U. S. N. Arrangements have been made for the exchange of an international telegraphic time signal and message.

Friday, September 9

Morning, 10 o'clock—General session, devoted especially to governmental surveys.

Afternoon, 2 o'clock—Sectional meetings:—

Section A. Physiography of the land.

Section F. Bio-geography.

Section H. Geodesy and geographic technology.

When Section F shall adjourn, on the completion of its work, it will be followed, in the same room, by Section C—Glaciers.

When Section H shall adjourn, it will be followed, in the same room, by Section E—Meteorology and terrestrial magnetism.

5 o'clock—Reception by Mrs Gardiner Greene Hubbard at "Twin Oaks."

Evening, 8 o'clock—Lecture by Mr Charles M. Pepper, "The Bolivian Andes."

Saturday, September 10

Morning, 10 o'clock—Sectional meetings as above.

Afternoon, 2 o'clock—Sectional meetings, continued.

Evening, 8 o'clock—Reception by President and Mrs Peary at the New Willard.

Sunday, September 11

Members so desiring will have the opportunity of spending a few hours on an excursion boat, passing Mount Vernon and other points of geographic interest on the lower Potomac.

At 7 o'clock the Congress will take a Pennsylvania Railway train at the Sixth Street station, arriving in Philadelphia at 10 p. m.

Titles of papers and the order in which they will be read will appear in the daily program.

ORGANIZATION

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The President of the United States

President of the Congress

Commander Robert E. Peary, U. S. N.

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The Minister from Turkey.

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AND THE

Presidents of Previous International Geographic Congresses

Duca di Sermoneta (Venice, 1881).
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Sir Clements R. Markham (London, 1895).
Ferdinand Freiherr von Richthofen Berlin, 1899);

AND THE

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Section I. Explorations.

Chairman	*Secretary*
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Section K. Educational Geography.

Chairman	*Secretary*
R. E. Dodge.	E. C. Jones.

Section L. Historical Geography.

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The following form is enclosed for use in the nomination of persons for membership

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DUES: Annual membership, $2; Life membership, $50. If check be enclosed, please make it payable to order of the National Geographic Society, and, if at a distance from Washington, remit by New York draft or post-office money-order.

.....*190*

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The NATIONAL GEOGRAPHIC MAGAZINE has on hand a few copies of complete back volumes which may be obtained at the following prices:

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The NATIONAL GEOGRAPHIC MAGAZINE

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WASHINGTON, D. C.

VOL. XV, No. 10 WASHINGTON OCTOBER, 1904

THE NATIONAL GEOGRAPHIC MAGAZINE

ADDRESS BY COMMANDER ROBERT E. PEARY, U. S. N.

PRESIDENT EIGHTH INTERNATIONAL GEOGRAPHIC CONGRESS

ON THE ASSEMBLING OF THE CONGRESS IN WASHINGTON SEPTEMBER 8, 1904

Gentlemen, Delegates, and Members of the Eighth International Geographic Congress:

FOR the first time, America welcomes you and is honored by your presence. For the first time we have the pride and pleasure of extending a hearty greeting to our distinguished friends and co-workers in the great mother science, gathered from the civilized nations of the world.

For the eighth time since its inception the International Geographic Congress meets to note the progress of discovery, to listen to the results of the researches of its Fellows, and to suggest and plan for the future.

Seven times it has met in the great capitals of Europe; now it meets in the capital of your young but buxom sister of America.

Numbers of you meet here again comrades of previous Congresses. Others have attended their last Congress, and survive only in their works.

Stanley and Nordenskjold, captains of the tropics and the Arctic, have passed away in the quiet of their homes, their strenuous work ended years ago.

Daly and Du Chaillu have died amid the peaceful surroundings of civilization.

Andrée and Toll have met their fate in the stress of struggle with the icy North.

There have been numerous "world happenings" since the last Congress, which, while not purely geographical, it may be well perhaps to note here.

When the last Congress met a struggle had been finished in the distant East far-reaching in its effects; the beginning of a new policy, a new line of thought and action, the first step in the inevitable and inexorable destiny of this country.

At the present time another struggle is going on in the same region, fateful with the greatest possibilities to two of our friends and neighbors.

Since the last Congress two republics have ceased to exist in Africa and a new one has been born in America.

In Asia a great new line of communication has been completed—the Trans-Siberian Railway.

Along the wide floor of the Pacific a world nerve vibrates today which did not exist when you last met—the new Pacific cable.

Wireless telegraphy is an accomplished fact today, not an experiment, and the atmosphere of the globe in a short time will throb incessantly with countless messages.

Finally, there is that vision of the centuries, that envious dream of monarchs and ministers since Gomara quested for the "Secret of the Strait" four hundred years ago—the Isthmian Canal, the union of the Atlantic and the Pacific—the grandest project, the greatest engineering, financial, and diplomatic problem of the age.

A fearless master hand has at a stroke cut the Gordian tangle that has hitherto defied the ablest statesmen and financiers of the world, and the nations today accept without question the Panama Canal as a fact.

A few years hence and the commerce of the world will pass freely from the eastern sea to the western sea, traversing almost air lines from port to port, at an enormous saving of time and distance and expense, and this great orient-and-occident-facing Republic will rest content with coasts united from Eastport to the Straits of Fuca.

Much has been done in the geographical world since the last Congress, both in the field and in the study, and the number of possible great discoveries is rapidly narrowing every year.

Only two great prizes now wait the present-day explorer—the North Pole and the South Pole.

It is interesting to note how, from Congress to Congress, the scene of geographical interest shifts from one region to another.

Africa, Arctica, Antarctica have followed in succession. What will it be next, or will some of the old loves continue to claim our advances until full surrender?

The most prominent feature of geographical work since the last Congress has been the activity in Antarctic exploration. The international program formulated at the last two congresses has been carried out, and a large and valuable amount of work done and material secured.

England, Germany, Sweden, Scotland, Belgium, and France have all sent ships to this region, and the result has been to wonderfully increase our knowledge of that most interesting portion of the globe.

I shall not attempt any details or discussion. These we shall have first hand from those who have led the expeditions and been intimately identified with them.

In the Arctic field there has been continued activity.

Abruzzi, the able and energetic young Italian duke, has in a splendid and effective dash recorded the nearest approach to the Pole, and has by his experience eliminated Franz Josef Land from further consideration as a polar base.

Such type of young man, possessing already the prestige of a distinguished name, devoting his time, his abilities, his personal means to the advancement of human knowledge, instead of wasting them upon idle amusement, commands my highest admiration.

The expeditions of Sverdrup and Peary have returned from their four years' absence—one with a magnificent delineation of that previous great gap in Arctic charts, the unknown regions west of Ellsmere Land; the other with the delimitation of the northern terminus of the Greenland Archipelago, the most northerly known land in the world.

Mr Ziegler, with commendable, but, I fear, misdirected persistence, is pushing his attack upon the Pole *via* Franz

Josef Land, and news from his expedition may be received at any time. Amundsen is in the field laying siege to the north magnetic Pole.

But there remains still the Pole itself, and the mystery of that three million square miles about it, which stand as a challenge and a reproach to us.

In Asia, "the roof of the world," there have been numbers of workers.

The American explorers, Pumpelly and the Workmans, have done good work. The latter have attained the highest altitude yet reached by human beings, 7,135 meters.

But the magnificent work of Sven Hedin, the great Swedish traveler, far surpasses that of all other explorers in this region. In fact, this explorer undoubtedly stands foremost in energy and extent and accuracy of his work among the active explorers of the day.

Lhassa, "the Forbidden City," the mystery and secret of central Asia, the unattained objective of many travelers, has been reached and reported upon by several, and today the English military expedition of Captain Younghusband occupies the city. The sacred city of the Llamas is a mystery no longer.

In Africa, once "the Dark Continent," the work of large exploration is at an end, and has been succeeded by the work of division and colonization. No longer the "Dark Continent;" it is known in its geographical entirety better perhaps than South America.

The fine French surveys in the central Soudan, L'Enfant's determination of actual water communication between Lake Tchad and the Atlantic, through the Niger system, and young Grogan's feat, the longitudinal traverse of the continent from Cape Town to Cairo, are worthy of note.

Abyssinia in Africa, like Tibet in Asia, is being traversed and studied by travelers of various nationalities, and Ethiopia is emerging toward a place among the nations of the world.

In North America, "the granary of the world," numbers of explorers have been busy, more particularly in Alaska and the northern portion of the continent, but this work will be so well covered by various members during the meetings of the Congress that I shall not attempt it here.

A feature perhaps of this region has been the recent activity of the Canadian government in exploiting the northern lands, though more in a political than a geographical mood.

In South America the main work since the last Congress has been that of the government boundary commissions.

In Europe, "the metropolis of the world," geographical work is now of necessity a work of detail and rigid scientific development.

Of this class of work perhaps no better example can be given than that inaugurated and carried on by Sir John Murray in the Scottish lakes.

The papers before the Congress cover this work so well that I need to go no further.

In the domain of the oceans the material obtained in connection with the surveys for the Pacific cables and the development of the Pacific "great deeps" stand prominent.

So much for the work in the field, the work which by many is regarded as only the raw material.

As for the advances in the study, the laboratory, the class-room, the textbook, the list of papers before the Congress in the Departments of Meteorology, Technique, Bio-geography, Anthropo-geography, and Mathematical, Economic, Historical, and Educational Geography will attest.

What yet remains to be done? On this I can touch only in the briefest and broadest way, and from a personal point of view. The Congress will determine this question for itself during its sessions.

The fact of my personal interest in the polar field does not affect the truth of

the broad statement that there is no longer any great pioneer work of geographical discovery to be accomplished except at the apices of the earth, at the North and South Poles.

Here alone large areas, guarded by the sternest natural obstacles to be found upon the face of the earth, still challenge and defy conquest.

It has been somewhat the fashion during the past few years, in the interest and enthusiasm excited for Antarctic work, to rather decry further Arctic work as not likely to be of value, and to assume that in the Antarctic region alone is there a field for really valuable scientific investigation.

I do not at all agree with this view. There are no 3,000,000 square miles of the earth's surface that do not contain scientific information of value much greater than the cost of securing it.

Further than this, I believe in doing the thing that has been begun, and that is worth doing, before shifting to a new object.

There is no higher, purer field of international rivalry than the struggle for the North Pole.

Uninfluenced by prospects of gain, by dreams of colonization, by land lust, or politics, the centuries' long struggle of the best and bravest sons of England, Germany, Norway, Sweden, Holland, France, Russia, Italy, and the United States, whose able delegates are here today, has made this field of effort classic, almost sacred.

The conquest of the Pole is a man's work as well as a geographical and scientific desideratum, and its attainment would move the man and the geographer in every one of you.

The South Pole, from a practical geographic point of view, is no less a prize (but I do not consider it a greater) than the North Pole, but the North Pole has a place in history, in literature, in sentiment, if you will, which the South Pole will never hold.

Granted the attainment of the North Pole, or that the attacks upon both can be carried on simultaneously, there is no greater believer or stronger advocate of the value and necessity for South Polar exploration and the desirability of pushing it to the very Pole itself than I.

I will note here but two other geographical feats of primary magnitude yet to be accomplished by the explorer.

The culminating peak of Asia remains yet to be won.

The culminating point of North America remains yet untrodden by human foot.

Large as has been the work done in the last nine years, the three salient resolutions of the Sixth and Seventh Congresses regarding Antarctic exploration, map of the world on a uniform scale, and oceanography still hold good, and I hope to see them reaffirmed by this Congress with a fourth in regard to Arctic work.

It seems to me we ought not to deny the advantages to science of *completing* the exploration of the Arctic regions, when the secrets of an area almost as large as Australia, an area within which a valuable paper before this Congress will indicate the probability of a new land, remain unknown.

And I sincerely hope that this Congress will not ignore a field of investigation which, now that the flood tide of Antarctic exploration has somewhat spent itself, resumes its leading place with five expeditions in the field or preparing to enter it.

The meeting of this Congress in this country holds great possibilities of good for us, both as individual geographers in being brought in direct contact with the work of our colleagues of other countries, who are hewing new paths and broadening old ones, and also as a country.

I earnestly hope that this session of the Congress will prove a great and last-

ing stimulus to the interest of our people in geographical and allied research.

We need a vigorous stirring up and awakening to the value of such work. With our abundant wealth, with our youth as a nation, our energy, push, ambition, and adaptability, yet as a country we have taken no part in large efforts in the geographical field for the past twenty years, but have allowed you, our friends across the water, to shame us by your splendid examples.

There is ample room for a larger force of active, able workers in the field of geographical investigation.

There is too much money devoted to schools and libraries and too little to the field of exploration and research, which furnishes the facts for instruction in the schools and material with which to fill the volumes in the libraries.

I sincerely hope that the stimulus of this Congress, the breadth and strength of the resolutions which it may pass, and the union here at this Congress, for a common object, of all the American Geographical Associations, all combined, will lead to such a general interest as will enable us to take up some broad scheme of exploration and investigation and pursue it systematically and persistently, not capriciously and spasmodically, to its ultimate end.

Personally I should like to see such an interest aroused as would enable us to take up Antarctic exploration, which our friends across the water have so splendidly begun and prosecuted for the last four years, and which I judge they will not pursue further at present, and with the advantage of their advice and experience, carry it steadily forward.

The whole history of Antarctic and Arctic exploration has been a series of eager spasmodic efforts, attaining a greater or less measure of success, accompanied in many instances by semi-frantic and lavish rescue expeditions, necessary in some instances, not necessary in others, followed by a reaction and apathy till the training and experience gained is forgotten, and a new generation, making another attempt, must begin all over again.

This is not the way. Such spasmodic efforts will never do the work in the way science today demands. There must be continuous work extending over a series of years. The project should be taken up with the understanding that it must be carried on steadily for five or ten or more years ; it must be handled like any humdrum business proposition ; it must be divested of any sensational tendency.

The idea that as soon as a party enters the Arctics or Antarctic circle preparations must begin for the rescue must be thrown to the winds.

The loss of a ship or a few men must be discounted.

Such things happen every day in the maritime world, but it does not keep other ships and men from continuing the same voyages.

The world is getting bigger and wealthier every day.

There are abundant means seeking new avenues of expenditures if only they can be interested. It is a time of big things. Our friends over the water have shown us an example in their munificent Antarctic Expedition.

If our geographical societies and scientific institutions and the government would unite, such scheme of work could be carried on at an annual expense not more than a quarter or a fifth of the annual income of some of our great institutions.

I have taken Antarctic exploration as an example. Personally I should prefer to see that carried out, but it might just as well be the continued systematic study of the ocean on a large scale.

The point I want to make is that the time is ripe, and we should have some broad national project of geographical investigation, of general interest and coördinated plan, on a continuing basis,

instead of frittering away of time and money on a heterogeneous variety of investigations of narrow scope and often of small value.

That there are other fields of investigation of great value and promise within the domain of this Congress goes without saying. Recognized specialists in these fields will bring them to the attention of the Congress in their own masterly way.

I have spoken upon those things upon which I think and feel strongly.

In conclusion, I wish to express our obligations and acknowledgments to His Excellency President Roosevelt, that splendid, vigorous, typical American, who stands at our head today, the fearless, unhesitating man of magnificently wedded thought and action, who has graciously consented to head the Congress;

To Baron Richthofen and his colleagues of the Executive Committee of the Seventh International Geographic Congress, for the way in which they have carried out the work intrusted to them by that Congress;

To our distinguished foreign visitors and friends, who have devoted so much time and effort to be present;

To those who, prevented by circumstances from being present in person, have sent us most valuable papers;

To Professor McGee and his colleagues of the Committee of Arrangements; and

To Professor Davis and his colleagues of the Committee on Scientific Program, for their tireless efforts in behalf of this Congress.

I cannot close without a word or two expressing my deep appreciation of the honor shown me in electing me President of this distinguished organization, a position previously held by such eminent men as De Lesseps, Sermoneta, Gobat, Markham, and Richthofen.

I have accepted the honor in the spirit in which I believe it was tendered, namely, as an expression of the sympathy and approval of the geographers and geographical associations of this country, and their interest in the work and aims with which I have been identified for the past fifteen years.

As such, I greatly prize it.

Further, I deeply regret that insistent press of that same work has made it impossible for me to labor for the Congress as I should have done.

The full and entire credit for the Congress, both in scope and detail, is due to the able and tireless chairmen and members of the Committees of Arrangements and Scientific Program and their associates, and to the delegates and members who have contributed the progeny of their brains to make it a success.

SOME EARLY GEOGRAPHERS OF THE UNITED STATES*

BY REAR ADMIRAL C. M. CHESTER, U. S. NAVY

ON an occasion like the present one, when distinguished men from all parts of the world meet together to consult with reference to the means for promoting the great objects for which our individual societies were inaugurated—a study of the earth and its inhabitants—it seems fitting that we should take at least a cursory glance at the work which has been

*An address to the Eighth International Geographic Congress.

done by our forbears in the way of collecting geographical data in order that we may plan for its future development, for it is history that must form a basis for all advancement.

In these strenuous days, when by the means of modern appliances so much is accomplished in a short time, we are apt to forget to what extent we are indebted to the pioneers in new fields of discovery, who by their labors have given to mankind such indescribable benefits, including untold millions of money. Such a matter-of-course has it become that geographical expeditions are now fitted out, even for the antipodes, with only a brief notice in our daily papers, while any story, however unimportant, provided its effect is to startle the mind, is given space *ad libitum*, and in many cases *ad nauseam*.

It is therefore through societies, such as we greet today in the city which is celebrating one of the principal events in geograpical history, to which must be delegated the duty of stimulating our people to further efforts at research in the special field of science which we have met to consider, assuring them that as long as "knowledge is power" no region that is unknown can be too unimportant for investigation.

This must be my excuse for taking up your time for a brief moment in a résumé of a portion of the work done in this cause by the service to which I have the honor to belong, the Navy of the United States. To cover the whole field of geographic exploration in a lecture of a few brief minutes is not within the power of any man, and hence I have restricted myself to the early achievements of this small corps of men with whose accomplishment I am best acquainted, and even as thus circumscribed must confine myself to a bare outline of the reports made, leaving to better hands much to be mentioned.

I think I may say that the United States Navy is one of the oldest, if not the oldest, of all the National Geographic Societies of this country, for scarcely had we become a nation before its officers began a study of our coast, near which in the early days of the Republic the most of its population resided, and of which very little was known. The summation of the information then extant was given in a few incomplete charts handed down from the early surveys, or rather reconnoissances, of our English ancestors that were so unreliable as to be practically useless. As our own coast became more familiar to the people, naval officers began to glean in other fields, and no part of the earth's surface was too distant to claim their attention.

This resulted in establishing a department within our naval administration which was known at first as the U. S. Naval Observatory and Hydrographical Department, and it has given to the world a vast amount of data gained from surveys or investigations in almost every country in the universe. And we must remember that to the U. S. Navy, as Humboldt has placed on record, the world is indebted for founding a new department of science, that of the Physical Geography of the Sea.

But few names stand higher on the roll of honor and but few men have lived whose work has been of more lasting benefit to mankind than that of the distinguished scientist, Commander Matthew F. Maury, late U. S. Navy, who was the originator and most valuable contributor to this branch of science.

SLACUM'S VOYAGE

In November, 1835, President Van Buren directed William A. Slacum, an officer of the U. S. Navy, to proceed to the western coast of the United States and endeavor "to obtain there all such information, political, physical, statistical, and geographical, as might prove useful or interesting to the government."

Slacum traveled through Mexico to Guaymas, and left that port on the 1st of June, 1835, intending to reach Oregon by land, but being informed of the impracticability of using the land route at that season of the year, he proceeded by sea, and after many vicissitudes only reached the mouth of the Columbia River December 22, 1836. Here he surveyed and plotted a chart of the mouth of that river, and also compiled a chart, from information gained, of the coast and country south of the Columbia. The four rivers, Klamath, Coos, Rogue, and Umpqua, which had never before been charted, appear on this map and were thus made known to geographers through his efforts.

THE WILKES EXPLORING EXPEDITION

The most complete exploring expedition ever fitted out from America up to the time of its departure was that which left the United States in 1838. The expedition sailed under the command of the then Lieutenant, afterwards Rear Admiral, Charles Wilkes, U. S. N., who was aided by a most intelligent band of officers well prepared for its onerous duties. The difficulties which attended Wilkes' expedition can hardly be conceived at the present time, when steam relieves the sailor of many cares and clears him from numerous dangers against which his predecessor had to battle formerly with sails only.

On August 19, 1838, the vessels left Chesapeake Bay, and after stopping at Madeira and the Cape Verde Islands arrived at Rio Janeiro, Brazil, from which it sailed on the 6th of the following January. From Rio Janeiro they proceeded to Rio Negro, in Patagonia, and Nassau Bay, in Tierra del Fuego. From this place two schooners attached to the expedition made cruises in different directions toward the South Pole, one of them, the *Flying Fish*, reaching latitude 70° 14′ S., nearly the highest latitude attained by Captain Cook and not far from the same longitude reached by him; but the season had already advanced too far for the best results, and they rejoined the squadron at Valparaiso in May, 1839. The *Vincennes* in the meantime was occupied with a survey of Nassau Bay. The schooner *Sea Gull* was lost in a gale soon after leaving Nassau Bay.

From Valparaiso the vessels sailed to Callao, Peru, where the *Relief*, being ill-adapted to the voyage, was sent to the United States.

On the 12th of July the squadron left the coast of South America and visited and surveyed 14 or 15 of the Paumotu Islands, two of the Society Islands, and all of the Navigator Group, and reached Sidney, New South Wales, on the 28th of November, 1839.

The vessels next proceeded on their second Antarctic cruise, discovering land in longitude 160° E. and latitude 66° 30′ S.

It should be said of Wilkes' discoveries in Antarctica that the recent expeditions of Captain Scott of the British Antarctic expedition, Dr von Drygalski of the German, Captain Bruce of the Scottish, and Captain Nordenskjold of the Swedish, all confirm the correctness of Admiral Wilkes' work in the frozen south, and as Mr Edwin Swift Balch said of him in a recently published article in the NATIONAL GEOGRAPHIC MAGAZINE, "show what a remarkably acute and accurate geographical observer Admiral Wilkes was." Let us not forget in our felicitations for these later gallant voyagers of the present generation how much we owe to the intrepid pathfinder who first announced to the world his discovery of the Antarctic Continent in 1840, nor the fact that his almost miraculous voyages were made in ships some of which would hardly be trusted outside of port at the present date.

During the absence of the expedition about two hundred and eighty islands were surveyed, besides eight hundred

miles of hydrographic surveys on the streams and coast of Oregon, and one thousand five hundred miles laid down along the land and icy barrier of the Antarctic Continent. Numerous islands of doubtful existence were searched for, shoals examined, and reefs discovered and charted; also many harbors were surveyed and several for the first time made known to the world. The latitudes and longitudes of the ports visited were determined with all possible precision, and a large number of the doubtful points in the geography of the Pacific cleared up. All this work was done with the accompaniment of innumerable dangers by land and by sea. The personal adventures alone would fill a volume both startling and interesting in the extreme.

The large number of charts produced from the records of this cruise evince alike the energy and industry of the commander and all his assistants.

There might be mentioned as a sequel to the Wilkes Expedition an examination of the Te Pito Te Henua (Easter) Island in the South Pacific Ocean, which took place under Lieutenant (now Rear Admiral) F. M. Symonds, U. S. N., while on duty as navigator of the U. S. ship *Mohican* in 1887.

The expedition was mainly in the interest of ethnology and generally prehistoric data, but quite an amount of geographical literature was added to our store in the Navy Department and published on the charts of the Hydrographic Office. The *Mohican* brought back to Panama the famous Easter Island statue, and the U. S. ship *Galena*, which vessel the lecturer had the honor to command, continued its passage to the Smithsonian Institution, where a study of it has added data to the scientific literature of that institution.

EXPEDITION TO THE DEAD SEA

One of the early scientific expeditions fitted out by the United States was that for the exploration of the Dead Sea. It was purely a naval expedition, and the selection of this branch of the public service to do the work was wise and economical. By education and familiarity with instruments of precision, naval officers were well fitted to make the surveys and handle the delicate questions of international comity that were likely to arise at that time in a country as turbulent as was that of the Ottoman government, with which its commander was required to deal. Furthermore, the general handiness and adaptability of the sailors, as well as their military training, made them singularly well suited for this class of work.

Lieutenant W. F. Lynch, U. S. N., was given charge of the expedition, and, indeed, he might be said to have conceived it. He was assisted by Lieutenant J. B. Dale and Passed Midshipman Richmond Aulick, U. S. N., two most efficient young officers. The U. S. ship *Supply* was assigned to carry the party to Syria, and left the United States for its destination November 26, 1847.

This novel expedition returned to the United States after an absence of nearly a year, its officers and men having overcome almost insurmountable difficulties. One of the officers, Lieutenant Dale, unfortunately succumbed to the fatigue, privation, and sickness incident to the cruise and gave up his life to the cause.

Besides a report that may be considered classic in character, Lieutenant Lynch brought back with him a large number of specimens pertaining to many of the sciences allied to geography.

The volume comprising the summary of the researches made by the intelligent officers of the party may be found in nearly every scientific library of the country.

EXPLORATION OF THE VALLEY OF THE AMAZON

In 1850 Lieutenant William L. Herndon, U. S. N., who had made a reputa-

tion as an explorer by very considerable service in Chile, was sent by the United States Government to explore the valley of the Amazon. He directed his course over the Andes from Lima, Peru, and, reaching the headwaters of that river, followed it to the sea. The object of the expedition was to ascertain the resources and future capabilities for trade and commerce of that immense watershed.

His valuable and instructive report was published by Congress and has remained ever since as the foundation for different expeditions, some of which will be referred to later.

He ran a line of soundings from the source of the Amazon, among the mountains, to its mouth in the Atlantic Ocean, and found it navigable for vessels of the largest class from the sea to the base of the Andes, a distance of nearly 3,500 miles. He also determined the geographical positions of important points at many places along its banks.

His assistant, Lieutenant Gibbon, also of the navy, taking a more southerly route.embarked upon the Mamore River at Cochabamba and descended that river to the Madeira and thence to the Amazon.

On two later occasions the government of the United States sent expeditions for surveying this river, one in 1878 consisting of the U. S. ship *Enterprise*, under command of Commander, now Rear Admiral, T. O. Selfridge, U. S. N. From the results of this work the Navy Department published navigation charts of the Amazon up to the bar of the Rio Negro, and of the Madeira up to the falls of San Antonio. These charts are now used to navigate the ships of nearly every country of the world which do business in the basin drained by this mighty river.

The next expedition was under the command of Captain C. C. Todd, with the U. S. ship *Wilmington*, which vessel steamed up the river as far as the city of Iquitos, a distance of nearly 2,400 miles, arriving there on the 23d of March, 1899. Captain Todd's report is replete with valuable information of a practical as well as of a scientific character, and the Navy Department has made extensive use of it.

The pathfinder in these waters, Herndon, ended his life in one of the most gallant and tragic episodes of the navy, going down with the steamship *Central America*, which he commanded, after refusing to get into the last escaping boat lest its capacity might be overfilled.

EXPLORATIONS IN THE RIO DE LA PLATA

Commander T. J. Page, U. S. N., in the U. S. steamer *Water Witch*, with a complement of intelligent officers, was, in the year 1854, engaged in an exploration of the Rio de La Plata and its tributaries. The results of his labors and tactful association with the citizens of the valley of that wonderful river was a most valuable contribution to our geographical knowledge of the whole watershed drained by it.

This great river system had just been opened to commerce, and the results of the voyage of the *Water Witch* were to prove to the world that ocean-going commerce could ascend the Paraná and Paraguay rivers to a point 700 miles above Asuncion, a city that is itself as far from the sea as St Louis is from the Gulf of Mexico.

During the progress of this important survey daily astronomical observations were made and soundings taken and charted along a length of river bed of 3,600 miles, much of the surrounding country was explored, and natural history collections made that were of great value to science, art, and commerce.

ASTRONOMICAL EXPEDITION TO CHILE

Lieutenant James Gilliss (afterwards Commodore), U. S. N., who was the founder of the U. S. Naval Observatory

and published the first American volume of astronomical observations, was also a large contributor to our geographical literature.

While he was director of the Astronomical Expedition to Chile in 1853, he was industriously engaged in collecting data touching the geography and statistics of that interesting country. One of his associates, Lieutenant McRae, U. S. N., returned to the United States by crossing the pampas to Buenos Ayres, procuring matter of great interest for his report of the trip, and later he returned to make further investigations regarding the interesting section through which he passed.

By their combined efforts the common geographical treasury of the world was largely augmented.

EXPLORATION AND SURVEY OF THE PANAMA ISTHMUS

Many attempts were made to fathom the almost "terra incognita" of the Panama Isthmus before the middle of the 19th century without more than negative results being produced; but the growing importance of the commerce of the United States created a strong pressure on the part of the American people to seek to break the barrier separating the two oceans which bound this country.

The people then naturally selected the Navy of the United States, whose main duty in peace times is to carry the flag into distant countries, to explore the Isthmus of Panama, and willing leaders were found to attempt to make a passage through the almost impenetrable forests of that wild country.

The first requisite of a canal which would carry our ships from ocean to ocean necessitated not only a crossing, but the lowest crossing that could be found, and as the axiomatic statement that "the bed of a stream or river furnishes the line of lowest levels in the basin drained" was early propounded as the basis for the exploration, the wisdom of the selection of the "hydrographers" of the country to do the work was self-evident.

It might be said that the commander-in-chief of all the expeditions which operated on the Isthmus was Rear Admiral Daniel Ammen, U. S. N. In the very beginning of the systematic investigation of the problem to which now has been found an answer he took great interest, and early and late hammered at the problem until the day of his death. Balked in his desires to personally lead a party in the field, using the commanding influence of his great friend, President Grant, who had called him to Washington mainly because of his extensive knowledge of this subject, he was instrumental in fitting out several expeditions to survey routes for the canal.

I need not go into the numerous details of the surveys made on the Isthmus of Panama by American naval officers to show how much the final project to join the Atlantic and the Pacific Oceans owes to them for its present promising condition, and indeed I must content myself with barely mentioning some of the names of the gallant officers engaged in this important undertaking, beginning with the attempt at exploration by Lieutenant Strain, U. S. N., in 1844. This expedition was unfortunate as far as its personnel was concerned, but nevertheless the information acquired was of great utility, negative though it may have been; for it has been only by a process of elimination that a final conclusion was reached as to relative advantages of the many routes presented to geographers for discussion. Strain proved that the Darien route was impracticable, and notwithstanding the mishaps of the party the results obtained created such emulation among his brother officers that they never let the matter drop until the final plans for building the "World's Canal" were completed.

The name of Lieut. T. A. M. Craven might also be mentioned in connec-

tion with the early explorations of the Isthmus, although his work consisted mainly of hydrographic surveys and a verification of the data made by other hands.

At the present time we have the distinguished naval officer, Rear Admiral John G. Walker, U. S. N., who followed Admiral Ammen in office as well as in his zealous advocacy of the scheme, as President of the Isthmian Canal Commission, which is to bring this wonderful undertaking to a final completion.

Of the fully organized surveying parties to enter the field for canal exploration the first was the Darien Expedition, under the command of Commander T. O. Selfridge, U. S. N. This expedition examined the Caledonia, Morti, and San Blas routes. The same expedition the next year (1871) surveyed the Atrato-Peranchita-Tuyra route. These surveys eliminated and settled many questions touching the practicability of building a canal.

Captain R. W. Shufeldt, U. S. N., in 1870, ran a level and transit line between Salina Cruz, on the Pacific, to the junction of the Blanco and Corte rivers, to develop the Tehuantepec route, but with his limited force it was not found possible to continue the line to the Atlantic. The information obtained, however, in connection with the results of the desultory examinations previously made, gave a very good idea of what the route was to be.

The Lake Nicaragua route, which was for a long time a favorite field for study, was given a thorough examination by several parties, the first being in charge of Commander A. F. Crossman, U. S. N., whose untimely death by drowning in the surf on the bar at Greytown disturbed for a time the progress of the work. Commander Chester Hatfield, his successor in command, then made an incomplete survey of Lake Nicaragua, which was stopped by the lateness of the season during which he operated.

The next year, 1872–'73, Captain E. P. Lull, U. S. N., who had been Selfridge's assistant in the Darien Expedition, completed the work of surveying this important route with such success as to give, as he said, a "close approximation to the best line which was to be found." Followed in command by Lieutenant F. W. Collins, U. S. N., further critical examinations were made, and a most exhaustive study begun by nearly all the officers who had been engaged upon the field work. They were assisted by that indefatigable expert, Civil Engineer Menocal, U. S. N., whose name will ever be linked with that of Nicaragua. Captain Lull soon after went to Panama for the purpose of making a close instrumental examination in the vicinity of the Panama Railroad.

His expedition practically completed the series of explorations undertaken by the United States, which furnished data covering the whole Isthmus as far as it is applicable to ship-canal purposes.

But by no means did this end the study of the field of possibilities, which has at last by a process of elimination culminated in the final plan to build the American canal at Panama, thus solving the world's greatest problem.

EXPLORATIONS IN CALIFORNIA

To another naval officer, Lieutenant Edward Fitzgerald Beale, U. S. N., America is indebted for many important explorations in the Far West, which followed his services in the navy on the California coast. He was the first who brought to notice the discovery of gold in that then distant state, which resulted in accumulating vast wealth for his countrymen and a great expansion of its domains. Beale became one of the first superintendents of Indian affairs in California.

HYDROGRAPHIC WORK IN THE ATLANTIC BY LIEUTENANT LEE

Before the advent of submarine cables gave rise to the necessity for an accurate knowledge of the bed of the ocean,

no particular attention was paid to the subject; but that distinguished physical hydrographer, Commander Maury, U. S. N., early saw the necessity which might arise for this knowledge in dealing with the question of encircling the globe by wire, and he lent his commanding influence to the making of an examination of the bed of the ocean.

Such research work as was required could only be carried on under governmental control and by the scientific seamen whom the government had in its employ. Hence in the fall of 1851 the U. S. brig *Dolphin*, under the command of Lieutenant S. P. Lee, U. S. N., was commissioned for a cruise which had an important bearing upon the commerce of the world.

The charts of the North Atlantic Ocean showed a mass of representations of rocks and shoals which had accumulated for many years, many of them of doubtful character and position, and yet no government seemed to feel the responsibility for making an investigation or expunging them from their charts. The work of investigating fifty-six of these doubtful dangers was assigned to Lee in the *Dolphin*, and he was at the same time to be employed "for testing new routes and perfecting the discoveries made by Lieutenant Maury in the course of his investigations of the winds and currents of the ocean," as authorized by an act of Congress dated March 3, 1849. The *Dolphin* returned to the United States in the summer of 1852, after an absence of eight months, during which the navigation of the Atlantic had been rendered safer and important contributions had been made toward the advance of knowledge in physical geography, meteorology, and other sciences.

Beginning with this expedition, if I were to complete the record and give the names of all naval officers who have taken a part in the study of oceanography, it would be almost necessary to copy the U. S. Navy Register. But of Lieutenant Brooke, who was the inventor of a method for detaching heavy weights which were dropped when the sounding line touched bottom; of Rear Admiral Sigsbee, who invented the first real sounding machine, and of Captain J. E. Pillsbury, who first solved the problem of anchoring ships in hundreds of fathoms of water and gave the first comprehensive study of deep ocean currents, mention must be made, but no amount of praise from me can add to their well-deserved world-wide reputation. This labor of investigating the bottom of the ocean has been so utilitarian in purpose that hardly a wire lies on the bed of the Atlantic or of the Pacific Ocean that has not been prearranged by the surveys of United States naval officers; and one of the glories of the U. S. Coast and Geodetic Survey, in which service until very recently naval officers have been employed as hydrographers, is that it has sounded minutely nearly 300,000 square miles of water and made deep-sea soundings over little less than a million square miles.

THE UNITED STATES NORTH PACIFIC EXPEDITION

This expedition was authorized by an act of Congress of August, 1852, which appropriated a large sum of money for use "in prosecuting a survey and reconnoissance for naval and commercial purposes of such parts of Bering Strait, of the North Pacific Ocean, and the China Sea, as are frequented by American whale-ships and trading vessels in their routes between the United States and China."

The vessels of the expedition were the U. S. ship *Vincennes*, the steamer *John Hancock*, and the brig *Porpoise*; also the steamship *John P. Kennedy* and the tender *Fenimore Cooper*.

The command of the expedition was first assigned to Commander Cadwallader Ringgold, an officer who had distin-

guished himself by his former participation in a work of like nature.

The squadron sailed from the United States in June, 1853, and proceeded to China by the way of the Cape of Good Hope and the Indian Ocean, reaching Hongkong, China, March 16, 1854. The civil war then raging in China, which required the constant attention of the squadron, prevented much surveying work in the first year.

Ringgold having become incapacitated for duty, Lieutenant John Rodgers, U. S. N., assumed command of the expedition and administered it to a successful ending. The details of the surveys made by Rodgers can not be dwelt upon here, but from the data collected there were made fifteen charts of harbors and special localities and twenty charts of island groups and extensive coasts and seas, among which were charts of the Bonin Islands; the Liu-Kiu group, and the islands to the westward; the mouth of the Pei-Ho River, as well as the Miao Tao Strait; the ports of Japan and the Tsugaru Straits, and ports in Kamchatka; the Aleutian group, and the first American chart of Bering Sea.

In September, 1855, the brig *Porpoise* foundered with all hands on board during a terrific typhoon that swept the China Sea of many ships, and thus was lost to the expedition, the navy, and the country, as the Secretary of the Navy stated, some of the most gallant and intelligent young officers that ever graced the service.

Captain Rodgers with the *Vincennes*, after entering Bering Strait on July 16, 1855, proceeded northward for the purpose of verifying the position of land placed upon the charts by the report of Captain Kellet, of H. M. S. *Herald*, in about latitude 72° N., longitude 175° W., and also to examine, if possible, Plover Island, which had been reported as seen by that officer, and he was then to endeavor to reach Wrangell Land. Running for Wrangell Land, which at that time had never been seen by Europeans, he failed to discover it, although he went within 16 miles of its reported position. Curiously enough, it was the vessel named after him, the U. S. ship *Rodgers*, which twenty-six years later, under the command of Lieutenant R. M. Berry, U. S. N., succeeded in reaching and charting this unknown land.

Having penetrated up to that time farther north in the Bering Sea route than any one else, Rodgers' Expedition returned to San Francisco and later made a cruise of exploration, searching for doubtful dangers in the Pacific Ocean to the westward of that port. After making a survey of Hilo Bay, Island of Hawaii, the *Vincennes* returned to New York by way of Cape Horn.

Besides a vast amount of geographical data sent to the Navy Department, Rodgers turned into the Smithsonian Institution natural history specimens to a considerable amount and of much value, and, as predicted by the Secretary of the Navy, the labors of the officers and men of the expeditionary force proved not only of great benefit to commerce, but also made interesting contributions to science.

COMMODORE PERRY'S EXPEDITION TO JAPAN

Probably no naval officer, and surely no U. S. naval officer, ever gained a greater triumph in foreign lands—a triumph the benefits of which have enriched all nations and whose full fruition is inconceivable even at the present time, a half century after the expedition which brought it about entered upon its work—than Commodore Matthew C. Perry, whose expedition opened to the civilized nations of the world the Empire of Japan about the middle of the nineteenth century.

The expanding interests of the United States incident to the discovery of gold in California and the rapid settlement

of that section of the country were just bringing into prominence the importance to us of the Pacific Ocean, when Perry, with great wisdom and forethought, announced the opinion that "it is self-evident that the course of coming events will ere long make it necessary for the United States to extend its territorial jurisdiction beyond the limits of the Western Continent, and I assume the responsibility of urging the expediency of establishing a foothold in this quarter of the globe as a measure of positive necessity to the sustainment of our maritime rights in the East."

The Navy Department soon after fitted out an imposing fleet under the command of this distinguished officer, who sailed for China early in 1853. The main results of that expedition, which brought into the community of civilized nations that wonderful country which has long since passed out of leading strings and has not only become a world power, but a *great* world power, need not be dwelt upon here. My object is to give a brief statement of its scientific accomplishments, which have been so eclipsed by its greater achievements of commercial importance as hardly to be remembered at the present time.

During all the time that negotiations were going on for a treaty that should secure protection and kind treatment to all Americans who might through any cause find themselves within the jurisdiction of the Japanese people, as well as grant privileges never before conceded to them, Perry used his large force in making surveys and studying the then little known countries which he visited. These included an extensive reconnoissance of Yedo Bay, up to within a distance of seven miles from the capital, and of the Liu Kiu Archipelago, where he established a port of refuge at Naka. While waiting at Naka to gain the confidence of the people of the group, which was a conquered dependency of Japan, Perry sailed to the Bonin Islands, and with two of his ships entered and established a harbor of refuge at Port Lloyd. He caused the principal islands to be explored and gave to the inhabitants varieties of garden seeds and some animals. He accumulated a large amount of geographical data, from which were made several charts of the Liu Kiu group of islands. Later the ship *Plymouth* was sent to the Bonin Islands to explore the interior of that group.

A monument recently established by the Japanese people at the place where Commodore Perry landed commemorates the important event which there took place, thus evincing the high appreciation which they hold for this distinguished man, who had reflected new honors on his country and its navy.

SURVEYS IN JAPAN

Lieutenant Murray S. Day, U. S. N., who was appointed as surveyor-in-chief in the Kaitakushi of Hokkaido, reports from Tokio, Japan, under date of March 27, 1876, that the preliminary work in the triangulation (Island of Yesso) has been extended over an area of about 12,000 square miles; that the survey of the coast line (as well as special surveys of the principal towns and villages of the coast) has been completed; that the accurate length of the Yubutsu base line has been determined by three measurements, and that the Hakodate base also has been prepared for accurate measurement; that the difference of longitude between Sapporo and Hakodate has been determined by the telegraphic method, and that a general map of the island has been constructed which shows the progress of the survey up to the close of the year, besides numerous sectional maps of coast lines, towns, and rivers, etc.

For a period of three years Day continued the work of organizing Japanese students into surveying parties and su-

perintending, in the survey of the Island of Yesso, all the field operations that underlie a scientific survey of large extent, including astronomy, triangulation, topography, and hydrography. It will be a source of congratulation to Americans to know that among the students that were trained by Day appear the names of some of the engineers upon whom Japan has relied in the past generation to take a leading part in carrying forward the magnificent geographical work that has now been accomplished in that empire.

Thus it might be said, as a sequel to the vast commercial and political advantages accruing to the civilized nations of the globe from the wise administration of Commodore Perry, an additional claim may be made in behalf of the Navy of the United States for the further development of Japan as a civilized nation resulting from Lieutenant Day's work.

In a like manner, as a sequel to the work of the United States North Pacific Surveying Expedition, the last chief of which was Commander John Rodgers, U. S. N., reference might be made to the surveys and explorations in China and Korea which took place under that officer while he was a rear admiral in command of the U. S. fleet on the Asiatic station in the years 1870–1873.

Rodgers, who, like his uncle, Commodore Perry, was a man of advanced ideas, was particularly interested in bringing into the civilized community of the world the then hermit nation of Korea. With the five vessels of his squadron he anchored off the Ferrières Islands, on the Korean coast, on the 19th of May, 1871, all hands full of high hope that at last this unknown country was to be opened to us, and through us to the people of the globe. But, though balked in his attempt to penetrate the fortified barrier surrounding Korea, Rodgers kept his officers and men busy in making surveys of such parts of the coast as could be reached, and the expedition brought back its share of glory and a considerable amount of data of a geographical character. Not only here, but in China also, did he keep his command occupied, and several surveys were made in the Yangtse River and elsewhere.

OBSERVATIONS UPON THE KOREAN COASTS AND SIBERIA

It was left to a brother officer of Admiral Rodgers, the late Rear Admiral R. S. Shufeldt, U. S. N., to accomplish what, but for the former's unfortunate conflict at arms with the Koreans, must have resulted in success, namely, to give to this hermit nation the blessings of civilization by inducing them to open their ports to the commerce of the world.

While many other nations besides the United States were enabled at the same time to make satisfactory treaties with the King of Korea, yet to Commodore Shufeldt, who, when in command of the U. S. ship *Swatara*, visited his capital and there took the initial steps toward swinging open the gates of the the country to the world, credit must be awarded for its accomplishment.

Immediately after the then Commodore Shufeldt had completed the treaty negotiations with the Korean Government at Inchon, on the west coast of Korea, three young officers—Lieutenant B. H. Buckingham, Ensigns George C. Foulk and Walter McLean—proceeded from Japan to the United States *via* Korea and Siberia for the purpose of studying the countries passed through. Their report is made up of over 160 pages of printed matter and is full of geographical and other information which at that time was greatly needed.

ARCTIC DISCOVERERS

The attempt to discover the Northwest Passage—the great geographical problem of the age in the early half of the nineteenth century—having allured

many an intrepid voyager to destruction, finally reached a climax in the reported loss of Sir John Franklin's expedition to the polar seas in 1847. This event cast a gloom over the British Isles and produced in this country the most profound sympathy and a determination to use all practical means to relieve the surviving members of the expedition. For the purpose of searching for the lost party, Henry Grinnell, Esq., of New York, offered to fit out two ships. The Government and Congress of the United States gave the scheme their cordial support, assumed the responsibility of equipping the vessels, and made the expedition national in character. Volunteers from the U. S. Navy were called to man the ships, and among the first to answer were Lieutenant Edward J. De Haven and Passed Midshipman Samuel P. Griffin. The former was placed in command of the expedition in the *Advance*, a brigantine of 144 tons, and the latter became his assistant in command of the brigantine *Rescue*.

The chief object of the expedition was the search for Sir John Franklin, but De Haven was directed by the Secretary of the Navy "to pay all due attention to subjects of scientific inquiry."

The Secretary of the Navy in his report of November 29, 1851, said:

"The expedition under Lieutenant-Commanding De Haven to the Arctic seas in search of the British Commander Sir John Franklin and his companions returned to the port of New York in October, having discovered only supposed traces of the objects of which it was in quest, and leaving in entire uncertainty their actual fate. . . . Though failing in the main object of the search, Lieutenant De Haven and his officers verified by their explorations many facts before unknown to science, but indicated in the course of investigation carried on at the Naval Observatory." From his data Grinnell Land was added to our charts.

The journal of Passed Assistant Surgeon E. K. Kane, U. S. N., the surgeon of the expedition, is replete in notices of natural features of the Arctic Zone which have now become history, and so well did he do his share of the scientific investigations of the expedition, in addition to his duty of caring for the sick, that he was selected to command the second search party.

This second party of seventeen persons in the same brigantine *Advance*, which had been a home for some of them in the De Haven Expedition, again crossed the Arctic Circle, and for two years and more made history for themselves and an honorable record for the Navy. Time does not permit an account of it more than to note that it was unsuccessful in the main object of the search, and was so overwhelmed by insurmountable difficulties as to require another search party in its own behalf. This was also a naval expedition, under command of Captain Henry J. Hartstene, U.S. N., comprising the purchased bark *Release* and the steamer *Arctic*, with forty officers and men for a crew. It brought back to the United States fifteen members of the Kane party and his vast store of geographical and scientific data, which, but for the relief party, might never have been found.

In 1870 Charles Francis Hall was directed to organize an Arctic polar expedition under the supervision of the Navy Department, and the U. S. ship *Polaris* was selected as a home for the force to be employed under his command. The expedition passed through the waters between Greenland and British America as far as latitude 82° 16′ north, a point much nearer the North Pole than had ever been attained up to that period. More than 700 miles of coast line were discovered or recharted, and it then became known that Kennedy's Channel opened into another body of water, to which Hall gave the name of Robeson Channel, in honor of

the Secretary of the Navy. Land was also discovered extending as far north as the 84th degree of latitude. Captain Hall died at Polaris Bay in 1871, and the expedition was shipwrecked and so delayed in returning to the United States that the Navy Department sent out a relief expedition composed of the U. S. ship *Juniata*, Commander D. L. Braine; the U. S. ship *Tigress*, Commander James A. Greer, and the steam launch *Little Juniata*, belonging to Braine's ship, was dispatched by that officer for the same purpose under command of Lieutenant G. W. De Long. This force obtained results which still further added to the fruits of the original expedition, the records of which were saved.

De Long in this search work acquired such a taste for exploration that he did not rest until he had obtained the command of a ship which was donated by Mr James Gordon Bennett, of New York. The *Jeannette* was fitted out by the Navy Department, under the authority of an act of Congress, for the purposes of north polar exploration. Being impressed that the problem of chances was in favor of the Bering Sea route, De Long, proceeding through Bering Strait, passed to the northwestward, with the object of reaching the North Pole.

The sad fate of this expedition is of too recent date to require a story here. De Long discovered Jeannette, Henrietta, and Bennett Islands, and they are charted and stand as monuments to the bravery, fortitude, and intelligence of this daring explorer. One little episode of the expedition—that of two of his party who were sent in search of food for their dying companions, returning with one little bird they had shot to divide up between eighteen stricken men—shows the wonderful control De Long, Chipp, Danenhower, Melville, and Ambler had over their men.

The country went into sincere mourning over the death of almost the entire party, but "their works shall live after them," and the story of their heroism is left us as a precious heritage.

In June, 1881, Lieutenant R. M. Berry, U. S. N., was sent with the U. S. Ship *Rodgers* to search for De Long's missing party, and in a fruitless attempt to penetrate the ice pack which had closed over the ill-fated *Jeannette* the officers of the *Rodgers* first surveyed Herald Island and afterward circumnavigated and charted Wrangell Island, proving conclusively that it was not a part of the Asiatic coast, as had been supposed by some geographers. With a view of affording every possible relief to the *Jeannette* Expedition, the U. S. ship *Alliance*, Commander George H. Wadleigh, was also sent in search of De Long. Wadleigh brought back a large amount of geographical data, as well as specimens relating to different sciences. Unfortunately, Berry's vessel was destroyed by fire in the frozen regions, but his party was saved. Still in pursuit of information concerning the *Jeannette*, Berry traveled afoot across northern Siberia from Bering Strait to the mouth of the Lena Delta, and returned to the United States, and by his trip contributed to the geographical treasury no small amount of information.

With our distinguished President of the Congress, Commander Peary, soon to tell his story, it would be presumptuous in me to make reference to what he, another naval officer in whom we all take great pride, has done for geography and science in general. Your votes, which have called him to this high office, show that his reputation belongs to the world as well as to the United States Navy.

PLAN OF A MAP OF THE WORLD

RECENT PROGRESS IN THE EXECUTION OF A MAP OF THE WORLD ON THE UNIFORM SCALE OF 1 : 1,000,000 (SIXTEEN MILES TO THE INCH)

By Dr Albrecht Penck, of the University of Vienna

THE Fifth International Geographical Congress, held at Berne in 1891, resolved to consider the plan of a map of the world on the uniform scale of 1 : 1,000,000, the sheets of which were preferably to be limited by meridians and parallels. A committee was appointed to deliberate on the question, and I had the honor of transmitting to it special propositions for such a map. But the work of the committee could not advance and a formal invitation to the different states to nominate special delegates to join the committee was not successful. The Congresses held at London in 1895 and at Berlin in 1899 could also not do much for the plan, and thus it seemed to many as if the plan would not be carried out.

In the last five years the situation has totally changed, and I am happy to be able to show to this Congress three maps which are worked essentially after the specifications for a map of the world on the scale 1 : 1,000,000. France made the first steps. The geographical service of the army had several years before studied in detail the propositions for such a map, and when the Cuban war and the disturbances in Persia and China attracted the attention of military men to the Antilles, Persia, and China the French service issued a series of maps of those parts of the world on the uniform scale of 1 : 1,000,000, limited by parallels and meridians. These sheets appear by execution and arrangement as parts of a general map of the world. Thirty-one sheets are already issued, twenty are in progress, and six planned.

The Cartographical Department of the Royal Prussian Land Survey has begun to publish a map of eastern China on the same scale of 1 : 1,000,000, the sheets here also being limited by meridians and nearly by parallels. Though this map intends to represent only eastern China, it adopts the scheme of a map of the world. Twenty-two sheets are planned, of which two are already completed. Finally, the much-discussed projection of a map of India on the scale of 1 : 1,000,000, with sheets limited by parallels and meridians, induced the Intelligence Division of the War Office at London to begin the publication on this scale and projection of a large map of Africa, which will embrace not less than 132 sheets, similarly limited. Eighteen of them have already appeared. Thus we have received in the last four years from France, Germany, and Great Britain three series of maps, containing 61 sheets, which are worked out on the same scale and on the same style of division of sheets. The maps cover large parts of the earth, nearly 10,000,000 square miles being represented on them, and they will ultimately embrace a whole continent, Africa, and very large parts of another, Asia, and parts of America. The maps realize in a large measure the proportions for a map of the world. They are executed on the same scale and represent parts of the earth's surface in such a way that they suffer almost nothing by the deformations of the chosen projection, each sheet of the French and English map being represented on its own plane, which is a face of the sphere of the earth, and the German maps being drawn on a cone, which touches the earth in China in

such a way that there is only a very little amount of deformation.

It is thus for the first time that distant parts of the earth's surface are represented so that they can be directly compared with one another. One who is familiar with Cuba needs only to lay the French map of this island at the side of the German or French map of China to see at one glance the space which has been overwhelmed in the Russian-Japanese war. A student of the coast lines can now compare the bays of Shantung with those of Cuba, and another can compare the behavior of the rivers in South Abyssinia with those in South China, and a third will be able by the chosen projection to determine the exact areas of lands, rivers, basins, lakes, and so on.

All this indicates considerable progress in the practical and theoretical study of different parts of the world, a progress which is not essentially affected by the fact that the maps are not as uniform as was desirable. Uniformity reigns as to scale and nearly as to the limitation of the sheets, each of them embracing a surface lying between 4 degrees of latitude and 6 degrees of longitude, but their arrangement is based upon different parallels and meridians. The English and the French maps use the equator as the initia parallel of the zones of the sheets; the German sheets, however, use the parallel of north. Still greater variety reigns as to the limiting meridians. The English maps use as the initial meridian for the columns of the sheets that of Greenwich; the German that of 4 east latitude; the French that of Paris. The French sheets of China do not therefore correspond to the German sheets of China, and if the Indian map be executed and the French map is extended over larger areas of Asia, as planned, its sheets will overlap the Indian sheets. Thus much double work will be done and the English and French maps can not be directly joined. The same trouble will happen with the English and German maps. We have in the English, French, and German maps not sheets of *one* map, but sheets of different maps, though each of these maps realizes the advantages of a map of the world.

In execution the different maps are based on the same principles that are proposed for a map of the world and now in general use. Water is represented blue, mountains by brown or gray shading or sketched contour lines; names and some ways of communication black, on the German and the French map partly red. But there are differences in the adopted signs for towns and in the style of lettering the names, though each separates duly the names of rivers, mountains, and townships by the character of the lettering. Greater differences exist in the measures adopted for height indications; the German and French maps use the meter, the English the foot. The greatest differences, however, lie in the orthography of names and in the fact that we see on the several series of sheets geographical terms in different languages. In all these respects the maps stand on a national and not on an international basis, and do not show that uniformity which one might wish for a map of the world. But it must be admitted that in many of these respects strong uniformity can be reached. The state of our geographical knowledge does not allow us to represent all countries with the same degree of accuracy; there can not be perfect uniformity in their representation; there will always necessarily be a certain liberty of representing unlike phenomena. The orthography used by the civilized nations being different, there can be no uniform orthography of geographical names, and the international orthography must depend for all those countries which use the Latin alphabet on a national base. Uniformity can only be reached as to a scale, as to the projection

of each sheet on its own plane, and as to the adopted geographical units. As to these three points, the first is quite and the second nearly uniformly treated in our maps; differences only exist as to the third, and here I believe that the Congress could advance future work very much by a resolution in favor of a certain initial meridian and of the geographical measures to be used on a map of the world. This resolution should, in my opinion, be in favor of the initial meridian of Greenwich and of the metric system, the latter being now introduced in many different countries of the world, and being technically adopted both in the United States and in Great Britain.

But an International Geographical Congress held in America could go still further. There are now more than 40 millions of kilometers, approximately a fourth part of the surface of the land, in process of being represented on maps on the same scale of 1 : 1,000,000, with important common features, and this quarter of the land belongs for the most part to the Old World, although a few American sheets have been executed by France. It would be a very important result of the Congress if it could induce the United States to do for America what Great Britain is doing for Africa—*i. e.*, to issue a uniform map for both continents of America. The want of a general map on a scale of 1 : 1,000,000 is felt very much not only for South America, on which continent only a few states, as Argentina, have maps on such a scale and a still larger one, but also for Canada, for Mexico, and the United States. Wonderful work has been done in the United States by topographers; excellent maps are edited by the Coast Survey and the Geological Survey. The coasts are prepared on a scale of 1 : 80,000, the interior on the scale of 1 : 62,500, 1 : 125,000, and in the Far West of 1 : 250,000; but there is such a want of general maps that a visitor to the United States is much at a loss what map to take as a companion. I studied this question seriously when fitting myself out for the excursions of the Congress, and, finally, I found that the best general maps of the United States are made in Germany, and I chose the maps of the new Stieler Atlas as companions; those of the previous edition had already accompanied me to the United States in 1897 and had proved very satisfactory. They contain as much as the scale can afford. This is 1 : 3,700,000. But this scale is far from being sufficient for containing such details as a traveler wishes to know, and it is far too little to give the impression of the grandeur of the country. The scale of 1 : 1,000,000 would be as necessary for a general map of the United States as it is for general maps of European countries. The atlases of Vivende Saint Mirtin, of Andree, of Debes, of Sohr-Berghaus, have adopted uniformly that scale for their maps of central Europe and France, and in those atlases we already find the material for a map of large parts of Europe on the scale of 1 : 1,000,000.

A map of America on the scale of 1 : 1,000,000 would at the same time be the third part of a general map of the world if it were based on the same general plan which is followed by the English, French, and German maps. The system inaugurated by the French map to limit the sheets by parallels of 4° to 4° and by meridians of 6° to 6° has been adopted by the other countries. The same system would be appropriate also for an American map, if at the same time it followed the arrangement of the English map by taking the equator and the meridian of Greenwich as initial dividing lines of the sheets. As to indication of heights, I would propose the adoption of the meter, already used in the French and German map. The latter is a model solution of the important question of geographical measures; it has adopted the Greenwich meridian and the meter. As to the style of execution of the sheets for the United

States, the topographical maps, with their brown contour lines, blue rivers and lakes, should be followed ; for South America and the extreme north and south of North America the representation by hill-shading would be sufficient. But the map should not be confined to land ; it should represent also the bottom of the bordering seas, as is done by the French map, and the inland lakes, for which sufficient soundings already exist. Geographical orthography presents for America no difficulties, for only three languages are officially adopted in the different countries—English, Spanish, and Portuguese. They afford the standard for writing geographical names ; Indian names must be given in that form which is usual in the several countries. Thus on this point uniformity could be more easily reached than in other parts of the world.

The Geographical Congress may be proud to have advanced by its resolutions in former meetings the execution of three great maps, which will cover one-third of all land. It should recognize, however, the work done by those countries which have acted in the essential points and acted upon its resolutions. It should thank the Geographical Service of the French Army at Paris, the Orthographical Department of the Prussian Survey at Berlin, and the Intelligence Division of the War Office at London, and it should extend the general knowledge of these maps by calling special attention to them. The Congress should invite the above-named offices to give an account of their work, accompanied, if it is possible, by parts of the maps in a supplement to its report. But it seems to be especially appropriate that the first Geographical Congress held in this country should take the first steps toward a general map of America. Thus to the third part of a map of the world, which is now practically in the way of execution, it would add the map of another third of the world. If in this way two-thirds of a general map of the world are started, the completion of the rest of the map can not fail.

METHODS OF EXPLORATION IN AFRICA

By Major A. St. H. Gibbons, of the Royal Geographical Society of London

In his explorations in Africa Major Gibbons has traversed about 22,000 miles. This is more than seven times the distance from New York to San Francisco, and is probably the record for African travel. What makes the distance all the more remarkable is that the routes were not hurried over, but every mile was accurately and systematically observed. Major Gibbons has crossed Africa from the Cape to Cairo, and also from the mouth of the Zambezi to Benguela. He is the author of "Africa from South to North through Marotseland," just published in two handsome volumes by John Lane, of New York and London.

FEW problems are incapable of solution by more than a single method, and such is the constitution of human judgment that opinion is usually divided as to the best means of attaining any given object.

In the case of opinions founded on hypothesis as distinguished from those based on positive data, it is seldom that a public verdict—even though arrived at by an overwhelming majority—can be definitely accepted as final, for the opin-

ion of a community, and, in fact, of the world at large, is constantly subject to modification, sometimes for reasons obvious to all, sometimes as a result of influences more subtle and obscure.

Such being the case, I recommend to the consideration of the Congress a principle which I submit is inseparably wrapped up with the best interests of geographical research in the Africa of today—a principle which hitherto has received but little attention at the hands of geographers at large, and still less, if any at all, by the general public.

In the school days of most of us an intelligent boy could acquire in a few hours all that was to be learned from the map of Africa—a huge yellow continent fringed by a coast-line, on which alone was to be found any information of a definite nature. The life-long labors, the enthusiasm, and the splendid successes of David Livingstone were already awakening throughout the world a latent interest in a continent the interior of which was better known in the days of Ptolemy than during the boyhood of our own fathers.

The development of a great and attractive idea is seldom allowed to lapse with the life of the initiator.

Thus the career of Livingstone sowed the seeds of other careers and added to the history of progressive civilization illustrious names which will retain their luster until the world forgets the meaning of the word manhood. The last of this first generation of eminent modern explorers died only a few months ago, and has left on record a career scarcely less remarkable for obstacles met and overcome than for the importance of the political and geographical results springing from it.

The exploration of an unknown continent, such as was Africa two generations ago, must necessarily proceed by stages. First, the main features of the continent must be discovered—its general physical construction, the main river systems, the character of the inhabitants, and so forth. In fact, a *general* knowledge of what the continent contains must be acquired. To attain this object it is necessary that expeditions should dive deep into the depths of the unknown, should draw on the map long lines which will intersect what may be described as the main skeleton and arteries of the body to be constructed.

With Stanley's last great trip across the continent this stage was practically developed, and the time had arrived when, in my humble opinion, the second stage was ripe for development, when the smaller bones, the veins, and the tissues should be pieced into the skeleton already constructed.

While fully acknowledging the valuable results derived from the accumulated labors of more recent African explorers, I submit that had geographers in general realized twenty years ago that it was time for generalization to give place to specialization—in other words, had recent exploration been directed more toward detailed research in specially selected areas and less toward what is, after all, little more than the construction of glorified route maps, the world's knowledge of Africa would today be more complete and more accurate than it is. It follows that to the traveler the former plan of campaign presents advantages which are denied the latter. An imposing journey from coast to coast is unquestionably of great personal and general interest. In passing rapidly from tribe to tribe and through various districts, the most difficult to please will not complain of monotony or lack of interesting experience. Latitudinal positions may be fixed with accuracy, longitudes less definitely. A more or less sketchy account of the many peoples encountered may be entered in the diary and a general idea of various local characteristics may be acquired, but these are more in the nature of first impressions, and, as the many conflicting ideas gleaned by different travelers in

one and the same district tend to show, are not always quite reliable, and it is sometimes difficult to determine what to accept and what to discard.

Compare with work done on this principle the result of routes equally long which have been followed within a circumscribed area—a single country, so to speak. To begin with, the time during which the explorer has been in touch with one and the same tribe will be calculated in months instead of days. If he is experienced in native character and methods, he will have gained the confidence of the people; he will have picked scores of brains on every subject on which he is in search of knowledge. From the outset he will have been learning facts and unlearning fiction. Having based his plans on hearsay information, he will have visited places of special interest; will have so arranged his routes as to enable him to fix cardinal points, to enter in detail the courses of important rivers, their sources, and those of many of their tributaries. The larger affluents will have been crossed and recrossed at such intervals as will have enabled him to determine their mean direction. The boundaries of tribes and subtribes will have been similarly treated, and the many crossings of routes and independent connections with the base will have supplied checks and counterchecks of the greatest value. The result should be a map which will stand the test of time. In addition to this, even if the explorer is not an all-round specialist, he will have collected as much data as will supply food for thought to the ethnologist, the naturalist, the botanist, and the geologist, and I venture to think he will, on his return home, be struck with the meagerness of the knowledge acquired during his journeys to and fro as compared with what he has learned in the objective country.

To efficiency in this case must be added economy, for once arrived at the base, there is no longer need to carry about more supplies than are required for the few months or weeks during which each subsidiary expedition is at work. Thus if the same caravan used for the conveyance of supplies from the coast or railway terminus is indispensable for the return journey it can be split up into as many small caravans as there are officers in the expedition, and these can work separately along preconcerted routes. If other means for the return journey are available, the bulk of the porters may be returned to their homes, and the local native—usually a much cheaper article—may be employed as necessity demands.

In conclusion, I would respectfully venture to remind the representatives of the many geographical societies assembled here in Congress that the choice of method in this direction is largely in their hands. The would-be explorer will very naturally prefer to proceed on popular lines, and will look for advice to those scientific experts in whose hands his work will ultimately be placed. If the Geographical Societies of Europe and America prefer to popularize the system recommended in this paper, the future explorer will more often work on these lines. If otherwise, reform in this direction will be less rapid and deferred.

THE SPECIAL TELEGRAPHIC TIME SIGNAL FROM THE NAVAL OBSERVATORY

In Honor of the Eighth International Geographic Congress, Including the Greeting Sent by the Congress to the Nations of the World and Their Replies

AN interesting incident of the reception at the Naval Observatory to the Eighth International Geographic Congress on the evening of September 8, 1904, was the sending of a special telegraphic time signal according to the plan followed daily at noon, but ending at midnight.

At the close of the reception as many of the members of the Congress as could do so waited in the large rooms of the Department of Chronometers and Time Service, while the rest of the visitors took stations on the lawn outside the open windows. Promptly at 5 minutes of 12 the current was turned on by Hon. Paul Morton, the Secretary of the Navy, all the connecting circuits having previously been closed, and the transmitting clock at once began to send out a click over the wires at every swing of the pendulum, with the usual omissions of one second at each half minute and five seconds at the end of each minute up to the last minute, when there is a break of ten seconds, followed by the click indicating the exact instant of midnight.

Through the voluntary coöperation of the Western Union and Postal Telegraph Companies and the American Telephone and Telegraph Co. and their connecting lines, the entire series of signals was transmitted not only throughout the United States, but very far beyond its limits. In fact, a report received on the following day from Adelaide, Australia, showed that the signals had met at that distant point one series coming from the east via Vancouver, Fiji, and Norfolk Island and the other from the west via the Azores, Lisbon, Gibraltar, Suez, Aden, Bombay, Madras, and Singapore.

These time signals were followed by a brief message from the Congress to the nations of the world, as follows:

"The Eighth International Geographic Congress, now in session in Washington, sends with this midnight signal from the Naval Observatory its greeting to the nations of the world, through the courtesy of the various telegraph and cable companies."

Those who waited a few minutes after 12 had the pleasure of reading a few early messages that were received in reply, while many other messages were received later and were read at the meeting of the Congress on the following day.

This plan was carried out so successfully only through the energetic voluntary coöperation of the telegraph and cable companies, to whom the success of this interesting feature of the reception of the Congress in the nation's capital was largely due.

The following interesting extracts from letters and telegrams have been furnished by Rear Admiral C. M. Chester, U. S. N., Superintendent of the Naval Observatory. The record is very impressive as indicating the perfection of a system by means of which the Naval Observatory clock can be practically heard around the world and a message from the Congress delivered

and acknowledged within a very few minutes from points as far away as Adelaide, Guam, and Mauritius.

PRELIMINARY ARRANGEMENTS

Western Union Telegraph Co.: Full instructions have been given covering general distribution of the special midnight time signal tonight and the exchange of messages with the Naval Observatory relating thereto. Direct connection has been arranged with the Tacubaya Observatory, Mexico City, the Cordoba Observatory, Argentina, and the Greenwich Observatory, England. The British Post Office Department has arranged for a direct wire between London and Rome, over which the signal will be sent to the Royal Observatory. The Great Northwestern Telegraph Co. has arranged to make the desired distribution in Canada, as has the Great Northern Telegraph Co., which is our connection for Sweden, Denmark, Russia, etc., and efforts are being made to have the Russian Telegraph Administration continue the distribution. The Eastern Telegraph Co. promises distribution over its lines and that company's coöperation in endeavoring to get the several continental administrations to distribute the signals.

Postal Telegraph and Commercial Cable Co.: We shall be glad to transmit the time signals and final message over our Pacific system to Manila. Will depute an operator to be in attendance at the Observatory at Washington for this purpose. Cable companies beyond London say with regret that they can not undertake transmission.

Central and South American Telegraph Co.: I have yours of August 31, and take great pleasure in forwarding same to our Galveston manager, with instructions to act on the night stated, September 8, in accordance with your request.

Telegraph Department, Canadian Pacific Railway Co.: Shall be very pleased to assist by transmitting time signals over the entire telegraph system of the Canadian Pacific Railway, and have wired Superintendent British Pacific Cable requesting that signals be forwarded over that system. A similar request has been made to the Superintendent of the Halifax and Bermudas and Direct West India Cable Co. We will also forward the signals from Vancouver to such stations as can be reached in Alaska.

Government Telegraph Service, Dominion of Canada: With view to complying with your request, have telegraphed Superintendent Yukon Telegraph, Vancouver, to make arrangements for transmission of time signals midnight Thursday, eighth instant. . . . Earnest congratulations upon the success that has attended your efforts in the demonstration of a world-wide coöperative signaling system.

Chief Signal Officer, U. S. Army: Have instructed the Signal Officer, Department of the Columbia, Seattle, Washington, to extend such courtesy to your service as may be practicable in transmitting the signals over the Seattle-Alaskan cable and lines of military telegraph in Alaska.

Hydrographer to the Bureau of Equipment, Navy Department: Copies of your letter have been forwarded to all of the branch hydrographic offices with direction that, if possible, they will observe the time signals and report the results.

TELEGRAMS RECEIVED IN REPLY

President Diaz, of Mexico, per Western Union Telegraph Co.: I respond with thanks to your generous salutation, and shall see you with pleasure when you come to Mexico.

President Francis, of the Louisiana Purchase Exposition, St. Louis, Mo., per Western Union Telegraph Co.: The time signals and message of greeting from the Congress are received during a reception to the international jury of awards. The officers and the interna-

tional jurors of the world's greatest exposition send cordial greetings to the International Geographic Congress in this its first session on the western hemisphere, and assure the Congress that it will be heartily welcome on September 19. The President of the National Geographic Society and other scientific men here present, including 1,000 jurors of international repute, join in thus greeting your distinguished body.

Adelaide Observatory, Australia, per Western Union Telegraph Co.: Your greetings gladly received and heartily reciprocated. Signals received, the last being at 2:41:33, Adelaide standard time, 9 hours 30 minutes east of Greenwich. (Interval, 11 minutes, 33 seconds.)

Adelaide Observatory, Australia, per Postal Telegraph Co.: Your greetings gladly received and heartily reciprocated. Signals received very erratic, the last being at 2 hours, 30 minutes, 14 seconds, Adelaide standard time, 9 hours and 30 minutes east of Greenwich. Also received signals via Eastern. (Interval, 14 seconds.)

Melbourne Observatory, Australia, per Western Union Telegraph Co.: Last signal received 3 hours, 9 minutes, no seconds. Acknowledge greetings and send best wishes International Congress. (Interval, 9 minutes.)

Sydney Observatory, Australia, per Postal Telegraph Co.: The signals from Washington to Sydney Observatory occupied in transit 2 decimal 25 seconds in reaching here, which was remarkably quick. In January last signals took 3 decimal 5 seconds in coming through.

Wellington Observatory, New Zealand, per Postal Telegraph Co.: Observatory acknowledges and cordially reciprocates kind greetings of Geographical Congress.

Madras Observatory, India, per Western Union Telegraph Co.: The Madras Observatory acknowledges the greeting of the Eighth International Geographical Congress at Washington, sent with their midnight signal, which was received here at 10:21:52.6, Madras mean time, and wishes success to the Congress. (Interval, 53.5 seconds.)

Royal Observatory, Mauritius, per Western Union Telegraph Co.: Message received Friday 9.08 a. m. Mauritius time. In thanking you for your greeting Mauritius prays that your labors may be attended with every success. (Interval, 17 minutes, 47 seconds.)

Royal Observatory, Cape Town, South Africa, per Postal and Western Union Telegraph Cos.: Noon. Success to your enterprise. Last of series of dots received here at 11 hours, 54 minutes, 19 seconds, Washington time. No further signals received here. (Interval, 2 minutes, 35 seconds.)

Astronomer Royal, Greenwich, England, per Western Union Telegraph Co.: Signals satisfactorily received and observed. Compliments to Geographical Congress.

Pulkowa Observatory, Russia, per Western Union Telegraph Co.: The Pulkowa Observatory, with sincerest gratitude, returns its greetings to the Eighth International Geographic Congress and wishes them entire success in their important enterprises.

Royal Observatory, Lisbon, Portugal, per Western Union Telegraph Co.: The Royal Observatory of Lisbon has received the midnight signals from Washington and sends its best greetings to the Geographic Congress and to the world-famous U. S. Naval Observatory with thanks.

Royal Observatory, Madrid, Spain, per Western Union Telegraph Co.: The director of the Royal Observatory receives at 5:2:30 a. m. the greeting of the Congress, and has the honor to state that this scientific center awaits with enthusiasm the results of the meeting. (Interval, 2 minutes, 30 seconds.)

Royal Observatory of Roman College, Rome, Italy, per Western Union Telegraph

Co.: September 9, 6.23 a. m. Last time signal received at 5 hours, 59 minutes, 50 seconds, central European mean time. (10 seconds early.)

Cordoba Observatory, Argentina, per Western Union Telegraph Co.: The astronomers of the Cordoba Observatory have received with sincere pleasure the signals and messages of the International Geographical Congress, and desire to express their hearty sympathy with the objects the Congress has in view. Signal arrived at 12 hours, 43 minutes, 14 seconds, Cordoba time. (Interval, 2 seconds.)

Rio Janeiro Observatory, Brazil, per Western Union Telegraph Co.: Observatory Rio thanks and reciprocates greetings of the Eighth International Geographic Congress with this signal of two twenty-seven Rio time. (Interval, 19 minutes, 41.4 seconds.)

Quito Observatory, Ecuador, per Western Union Telegraph Co.: Signal arrived at 11.47, Quito time. The Director General of Telegraphs and Observatory sends members Geographical Congress salutation and felicitation. (Interval, 2 minutes, 1 second.)

National Observatory of Tacubaya, City of Mexico, per Western Union Telegraph Co.: Received signals 36 hundredths slow and congratulate you on the success of the experiment.

McGill College Observatory, Montreal, Canada, per Western Union Telegraph Co.: Signals as received on our chronograph were 10 hundredths of a second slow of our standard clock signals. Observatory acknowledges and cordially reciprocates kind greetings of Geographical Congress.

Toronto Observatory, Meteorological Service of Canada, per Western Union Telegraph Co.: Your signal received 0.12 of second after the hour by our clock 0.12 slow, which makes your signal 0.23 slow of our calculated time. We observed tonight for time chronograph record.

Naval Governor of Guam, Ladrone Islands, per Postal Telegraph Co.: The American colony and native inhabitants of Guam send thanks for the cheering message of the Eighth International Geographic Congress, at Washington, and invite them to hold their next session in this beautiful and happy island.

Commandant of Naval Station, Honolulu, H. I., per Postal Telegraph Co.: Time signals received, Greenwich time, five hours, no minutes, two and three-tenths seconds. (Interval, 2.3 seconds.)

Commanding Officer, Marine Barracks, Sitka, Alaska, per Western Union Telegraph Co.: Approximate time, seven fifty-eight sixteen and six-tenths, Coast Survey magnetic station. No correction made for retardation of transmission, which is estimated to be quarter second at Seattle office (22.9 seconds early).

Observatory of Harvard University, Cambridge, Mass., per Western Union Telegraph Co.: Signals approximately one-tenth of a second late.

Lick Observatory, Mt. Hamilton, Cal., per Western Union Telegraph Co.: The Lick Observatory sends greeting of cordial good will to the Eighth International Geographic Congress, for the study of geography, like that of astronomy, has for its main purpose advancement of civilization in all lands. Your clock beats preceded ours by 0.24 of a second.

Yerkes Observatory, Williams Bay, Wis., per Western Union Telegraph Co.: The Yerkes Observatory returns the greetings of the International Geographic Congress and wishes every success to the Geographic Society.

Observatory of Princeton University, N. J., per Western Union Telegraph Co.: The Princeton Observatory, now in session, sends its greeting back to the Eighth International Geographic Congress. We are well located and hope other points will soon be equally well known.

Lowell Observatory, Flagstaff, Ariz., per Western Union Telegraph Co.: 10 p. m. The Lowell Observatory gratefully acknowledges the message of greeting from the Eighth Geographic Congress and begs leave to express its appreciation and good wishes for the valuable work done by the Congress for science.

Goodsell Observatory, Northfield, Minn., per Western Union Telegraph Co.: Goodsell Observatory, Northfield, Minn., sends greetings to International Geographical Congress. The Washington time signals came perfectly, and we took the record with our mean-time clock on the chronograph for the 5 minutes. The measured interval was very closely one-tenth of a second, Washington slow, as it should be.

Washburn Observatory, Madison, Wis., per Western Union Telegraph Co.: Greeting from Washburn Observatory; time signal received 10 hours, 59 minutes, 59.7 seconds (interval, 0.3 of a second).

Chamberlain Observatory, Denver, Col., per Western Union Telegraph Co.: The signals were received fairly well, but were somewhat irregular. The result obtained for transmission time is seven-hundredths of a second.

Laws Observatory, Columbia, Mo., per Western Union Telegraph Co.: Special series of time signals were received on the chronograph of this observatory along with signals from our own clock. The midnight signal was registered at 10 hours, 59 minutes, 59.46 seconds, central standard time. (Interval, 0.54 of a second.)

Allegheny Observatory, Allegheny, Pa., per Western Union Telegraph Co.: The signals from your observatory were recorded on our chronograph 0.42 of a second later than our own signals.

Observatory of Mare Island Navy Yard, Cal., per Western Union Telegraph Co.: Time was received at Mare Island thirty-two-hundredths of a second early.

Branch Hydrographic Office, New York, N. Y., per Western Union Telegraph Co.: Time signals received O K at New York.

It may be added that the reported receipt in some cases of the time signals at a time earlier than when they started, probably means that the latter portion of the 5-minute series of signals failed to get through the telegraphs or cables, so that the final signal received started earlier than midnight.

RESOLUTIONS ADOPTED BY THE EIGHTH INTERNATIONAL GEOGRAPHIC CONGRESS, SEPTEMBER, 1904

MAPS ON SCALE OF 1 : 1,000,000

TWO resolutions introduced by Dr Albrecht Penck, of Vienna:

1. The Eighth International Geographic Congress at Washington presents its thanks to the Service Geographique de l'Armée à Paris, to the Kartographische Abteilung der Königlisch-Preussichen Landsaufnahme, in Berlin, and to the Intelligence Division of the War Office at London for having commenced the publication of large maps on the scale of 1 : 1,000,000, which correspond in a general way to the maps of the world, proposed by the Congress at Berne, and it invites these offices to prepare an account of their maps, accompanied, if possible, by parts of them, for publication in the report of the Washington meeting.

2. The Congress proposes to the government of the United States the execution of a general map of America on the scale of 1 : 1,000,000, similar to the maps on the same scale of Asia, China, and Africa, now in preparation by the Service Geographique de l'Armée à Paris, by the Königlisch - Preussiche Landsaufnahme, in Berlin, and by the Intelligence Division of the War Office at London, each sheet of the map being projected on its own plane and being limited by parallels 4 degrees apart and meridians 6 degrees apart, the initial meridian for the division being that of Greenwich, the initial parallel the Equator and the standard of measures being the meter.

POLAR EXPLORATION

The following resolution introduced by Sir John Murray:

The Eighth International Geographic Congress, realizing that the only untouched fields for geographical discovery are the regions immediately surrounding the poles of the earth, desires to place on record its sense of the importance of forthwith completing the systematic exploration of the polar areas. It is very desirable that the experience gained by men of science and officers in the recent Antarctic expeditions should be turned to account by following up without delay the successes they have obtained. The Congress recognizes that the Arctic regions possess a more immediate interest for the people of North America and expresses the confident hope that the expeditions now being prepared will be so supported as to secure early and complete success.

EARTHQUAKE INVESTIGATION

The formation of the International Seismological Association has accomplished the wishes of the Seventh Congress in this respect: The Eighth International Congress sends its congratulations to the International Seismological Association, whose further work is awaited with great interest.

DEEP-SEA MAPS AND NOMENCLATURE OF THE EARTH'S BOTTOM

The Eighth International Geographic Congress expresses its thanks to His Serene Highness, the Prince of Monaco, for having executed the map of the ocean, the execution of which was desired by the Congress of Berlin, and expresses especially its agreement with the chosen scale and projection, with the adoption of the meridian of Greenwich as initial, and with the adoption of the meter for indication of the depths, and the principle of the system of international submarine terminology used.

RULES FOR GEOGRAPHIC NAMES

Local names are, as far as possible, to be preserved not only in those regions where this is already an established principle, but also in the southern oceans. They should on this account be determined with all the accuracy possible.

Where local names do not exist or can not be determined with safety, the name of the first discoverer is to be applied until further investigation. The arbitrary altering of historical, long-existent names, well known not only in common use but also in science, is to be regarded as extremely reprehensible, and every means should be employed to resist such alterations. Inappropriate and fantastical names are to be replaced, as far as possible, by local and more appropriate names.

The above rules are not to be rigorously construed, yet they should be followed to a greater extent than heretofore by travelers and in scientific works. Their publication in periodicals as the opinion of the Congress will probably prove of great weight. Although in recent years many official systems of determination of geographic names have been enunciated, we have still much evidence of the influence which the wishes

of the International Geographic Congresses exert over the decision of the official authorities. To these geographical societies are urged to give wide publicity.

INTRODUCTION OF THE FRACTIONAL SCALES OF MAPS

The Seventh International Geographic Congress expressed the urgent wish that upon all charts, including those published by those lands still employing the English and Russian systems of measurement, along with the scale of geographic coördinance, the scale of reduction should be expressed in the usual fractional form, 1 : x, and that the latter be added to all lists of charts covering land and sea, and requested the Executive Committee of the Congress to bring this decision to the attention of all governments, geographical societies, and establishments engaged in the publication of charts.

The advantage to be derived from the support of this resolution, which had its origin with the editor of Peterman's *Mitteilungen*, and the extensive dissemination of the resolution is at once evident. In English publications a custom has arisen of adding a statement of the ratio 1 : x to the usually employed x miles to one inch. In America the custom has arisen of going even a step beyond this, namely, the addition of the ratio of reduction has led to the direct application of the decimal system in the units of measure adopted upon the chart.

To this geographical societies are urged to give wide publicity. This resolution of the Seventh Congress is reaffirmed.

THE DECIMAL SYSTEM

The Seventh International Geographic Congress expresses itself in favor of using a uniform system in all geographical researches and discussions, and it recommends for this purpose the employment of the metric system of weights and measures, as also the employment of the centigrade thermometric scale.

It is at least highly desirable that there should always be added to the introductions of the Fahrenheit scale and to the Reaumur scale their equivalent upon the scale of Celsius. Similarly, the revived activity in this question, which reaches even more deeply than the former into the well established customs of daily life, has proved that the Congress is not without value in promoting international uniformity and simplicity. Although the metric system of weights and measures has made slow progress, and this alone through the portals of scientific work, its application to geophysics and geography has already made a fair beginning. In England a special organization entitled the Decimal Association has taken charge of the matter. The Commonwealth of Australia has entrusted the subject to a commission. We are without knowledge of the efforts in this direction thus far made in Russia. Geographical societies are urged to give wide publicity to this resolution. These resolutions are reaffirmed by the Eighth International Geographic Congress.

COLLECTION OF RECORDS OF DRIFT ICE

This work is progressing satisfactorily in charge of the Danish Meteorological Institute, with the coöperation of various national offices. The Eighth International Geographic Congress expresses its thanks to the Danish Meteorological Institute and the coöperating offices for their systematic collection of records of drift ice.

STATISTICS OF POPULATION IN COUNTRIES WITHOUT CENSUS

The following resolution was introduced by the Hon. Carroll D. Wright, the U. S. Commissioner of Labor, and was agreed to :

Moved that a committee of five be

appointed by the President to confer with a committee of the International Statistical Institute on methods of obtaining the population in countries taking no census.

STANDARD TIME

The following resolution, introduced by E. E. Hayden, was adopted:

Resolved, In view of the fact that a large majority of the nations of the world have already adopted systems of standard time based upon the meridian of Greenwich as prime meridian, that this Congress is in favor of the universal adoption of the meridian of Greenwich as the basis of all systems of standard time.

PUBLICATION OF PHOTOGRAPHS

The following suggestion, introduced by Dr Albrecht Penck, was adopted:

It is suggested by the lantern slides shown by Mr Siebers and by the photographs by Mr Willis that it is desirable that in these and the cases of other exploring travelers photographs of geographical significance might be published, and accompanied by short explanatory notes, so that they may form collections of representative physical features of different parts of the world.

THE NINTH CONGRESS

The invitation extended by the Government of Switzerland and the Geographical Society of Geneva to hold the Ninth International Geographic Congress at Geneva in 1908 was accepted.

CARTOGRAPHICAL ASSOCIATION

The following resolution, introduced by Dr Albrecht Penck, was adopted:

The Congress refers the proposition of Mr Schokalsky and the paper of Mr Schrader to the committee appointed at the Congress of Berlin concerning the Cartographical Association. This committee is requested to report on the necessity of a Cartographical Association to the next Congress. In the meantime the committee might interest geographical societies in the plan and in the necessity of dealing with maps in geographical journals in a more detailed way than is now usual, and in showing that the general use of maps should be popularized and extended by instruction in schools, and the commerce with maps should be better organized.

The committee being now reduced by the death of General Titto and the withdrawal of General Heinmek in favor of Mr Schrader, the Congress appoints the following gentlemen to the committee:

Mr Franz Schrader, Paris.
Jules de Schokalsky, St Petersburg
Professor Oberhummer, Vienna.
Mr Gannett, Washington.
Mr Bartholomew, Edinburgh.

The committee was appointed, and Mr Gannett was designated as chairman.

EIGHTH INTERNATIONAL GEOGRAPHIC CONGRESS

THE Eighth International Geographic Congress was formally opened by Commander R. E. Peary, President of the Congress, Thursday morning, September 8, in the large hall of George Washington University. Hon. Charles D. Walcott, as the personal representative of President Roosevelt, welcomed the Congress to the United States.

Mr Walcott, in his brief remarks, emphasized the fact that the practical side of geographical science had been specially followed in this country:

"We have, with our Canadian and Mexican neighbors, a large country, containing a great variety of geographic features, and in the work of making it a fit place of abode for the American people geographic factors have had much influence. Hence the study of our own geography has had a practical bearing, as well as a theoretical interest to us, and it has received much attention.

"Recent events, moreover, have intensified the interest of the American people in geography and expanded the field of their study to the limits of the earth. The United States has recently been placed in a position involving widespread duties and responsibilities. While other countries have for generations borne the burden of policing the remoter parts of the earth, this country has until recently taken little part in those labors.

"The expansion of the country has increased the geographic knowledge of the mass of the people, for the country's welfare holds the attention of every citizen. Our interests in the Philippines have quickened our thought concerning the problems of all the East. While all aspects of geography have had a great revival among us, we are, perhaps, especially and most directly concerned with the commercial aspects of the science."

Dr G. K. Gilbert, Acting President of the National Geographic Society, welcomed the Congress on behalf of the Society.

"Your visit to our land finds us in the midst of a period of exceptional growth of geographic interest. As you have just been told in the message brought by Dr Walcott from the President of the United States, our geographic outlook as a nation has been revolutionized by the recent acquisition of a number of insular dependencies. While our people as individuals are divided in opinion as to the advantage of that acquisition, we are of one mind in accepting the responsibility involved and in recognizing the need of a colonial policy and a colonial system. With that acceptance and that recognition comes a new need for broad geographic knowledge, and the nation is eager, as never before, for information on a wide range of geographic subjects and an important array of geographic problems.

"In the field of physical geography we have long been active, and we have felt that we were measurably in touch with the geographic scholars of other lands, but in the geography of countries, in the geography of industries, and in the geographic problems of administration we are the merest tyros. And now that you, the geographers of the Old World, have come to our shores, we are eager to listen to all that you have to tell us.

"The National Geographic Society, having its home at the seat of government, and including in its membership the official geographers of the nation, is peculiarly appreciative of the opportunities afforded by this occasion, is peculiarly grateful that you have consented to favor us by your presence. On behalf of that society I offer you a hearty welcome to our land and to our city."

By direction of the Congress the following telegram was then sent to President Roosevelt at Oyster Bay:

"The President:

"The Eighth International Geographic Congress, now in session in Washington, returns hearty thanks for your welcome, presented in the speech by your representative, Dr Walcott."

The telegram was signed by Commander Peary as President and Mr Henry Gannett as Secretary of the Congress.

M. Henri Cordier, President of the Société de Géographie of Paris, delegate of the French government, responded to the addresses of welcome on behalf of the government representatives. Prof. Albrecht Penck, of Vienna, responded on behalf of the geographical institutions, and Dr Yule Oldham, of England, on behalf of the geographical societies. President Peary then delivered his address as president, printed in the earlier pages of this magazine.

The report of the executive committee of the Seventh International Congress, transmitted by Baron Richthofen, president of that congress, was presented by Prof. Oberhummer of the University of Vienna. Baron Richthofen expressed in a letter his disappointment at not being able to attend the Eighth Congress.

Commander Peary next presented the Swiss Minister, who in turn introduced Prof. de Claparede, President of the Geographical Society of Geneva and the delegate of the Swiss government. On behalf of his government, Prof. de Claparede extended to the Congress a most cordial invitation to hold its ninth session in Geneva in 1908, that year being the fiftieth anniversary of the founding of the Geographical Society of Geneva.

Prof. Bela Erodi, of Budapest, representative of the Hungarian government, was introduced, and extended an invitation in behalf of his government and the Royal Geographic Society of Hungary to hold the Ninth Congress in Budapest.

It is impossible in this limited space to enumerate the 250 scientific papers presented at the various sessions of the Congress. Several of them are published in this number, and also abstracts of a number of others. Additional papers and abstracts will be published in succeeding numbers of this Magazine.

The social sessions of the Congress in Washington included an informal reception at the home of the National Geographic Society Wednesday evening, September 7; a reception at the U. S. Naval Observatory by the Secretary of the Navy and Admiral and Mrs Chester (see page 411) Thursday evening; a reception at "Twin Oaks" by Mrs Gardiner Greene Hubbard Friday afternoon, and a lecture Friday evening by Charles M. Pepper on "The Bolivian Andes"; a reception by Commander and Mrs Peary Saturday evening, and on Sunday a trip down the Potomac as guests of the National Geographic Society on special steamers to Mount Vernon, which, through the courtesy of the directors of the Mount Vernon Association, was specially opened on Sunday for the Congress.

Sunday evening, September 11, the Congress took a special train to Philadelphia, where they were welcomed by the Geographical Society of Philadelphia and handsomely entertained during Monday. In the morning Independence Hall and the Commercial Museum were visited. A luncheon was tendered the Congress at Houston Hall by the University of Pennsylvania, after which they were driven in tallyhos through the magnificent Fairmount Park and Wissahickon Drive, being personally conducted by President Bryant, Dr Angelo Heilprin, Dr Talcott Williams, and members of the Philadelphia Society. In the evening the Geographical Society of Philadelphia gave a dinner to the Congress at the

Some of the members of the Eighth International Geographic Congress

Grouped on the steps of the Treasury Building, Washington, September 10, 1904

Photo by Buck

A group of the Eighth International Geographic Congress

Taken in the Free Academy of Arts and Sciences, Philadelphia, September 12, 1904

Photo by William H. Rau

Philadelphia Country Club. President Henry G. Bryant presided and introduced those answering toasts, who were: Count von Pfeil for Germany, Dr Hugh Robert Mill for England, Henri Cordier for France, Mr Hioki, First Secretary of the Japanese Legation, for Japan, and Dr Bela Erodi for Hungary. After the dinner the Congress proceeded to New York by special train.

At New York the Congress was hospitably received by the American Geographical Society, the members of which did their best to give the visitors a good time. Several scientific sessions for the reading of papers were held. A reception was given by the American Geographical Society at its home Tuesday evening and a subscription dinner in honor of the foreign delegates Wednesday evening. On both days the American Museum of Natural History entertained the Congress at luncheon. On Thursday the Congress were the guests of the American Geographical Society on a trip up the Hudson by special steamer to Fishkill and West Point. The day was perfect. The air had been cleared by a heavy rain the night before, so that the magnificent scenery of the Highlands appeared in majestic distinctness and beauty. At Fishkill the party disembarked and proceeded by trolley to the top of Mount Beacon. Here Dr William M. Davis gave an instructive description and explanation of the landscape.

"Like the lower Potomac, the Hudson below Albany is not a normal river; its volume is not determined by the amount of rainfall upon its drainage basin, but by the depth at which its bed stands beneath sea-level. The present depth of the Hudson River bed below sea-level has ordinarily been explained by a depression of the land; but since it has been recognized that glaciers can erode below sea-level, it is difficult to say how much of the depth of the channel is due to depression of the land and how much to erosion by ice. The extension of a navigable tide-water channel nearly 150 miles northward up the Hudson to Albany, and the opening of the Mohawk Valley west of Albany, between the Catskill and the Adirondack mountains, has made communication easy between the harbor of New York and the prairies of the West. The contrast between the Hudson and the Potomac in this respect is very striking. The gorge of the Highlands is therefore a path of most active traffic, by rail as well as by boat; and New York is for this reason the commercial metropolis of the United States."

From Fishkill the party returned to West Point, whence their special train carried them to Niagara Falls, arriving there Friday morning, September 16. The early part of the day was passed in examining the falls. At 11 a. m. the Congress assembled in the local theater to hear Dr G. K. Gilbert deliver a suggestive address on "the Physical Geography of the Falls and Cataract." The cataract as a thing of beauty is doomed, for the water is being fast appropriated for power. About 3 per cent of the water is now used, and when the plans now in course of construction are completed this will be increased to 19 per cent. It is estimated that 5,000,000 horsepower are easily available. The average yearly retreat of the Horseshoe Falls is from 4 to 5 feet; the American Falls are not retreating appreciably. Before many decades have passed the retreat of the Horseshoe Falls will cut off the water from the American Falls, so that the latter will cease to exist. The gradual tilting of the lake region will some 3,500 years hence cause the waters of Lake Erie and of all the lakes to flow into the Illinois River and thence into the Mississippi. Niagara Falls and Chicago will then disappear.

In the afternoon the Congress took a three-hour trolley ride around the falls and cataract, being personally conducted by Dr Gilbert, Dr Davis, and Dr Penck.

The Congress reached Chicago on the morning of Saturday, September 17,

and were there entertained by the Geographical Society of Chicago. In the morning, sessions were held in Kent Theater of the University of Chicago, according to the following program :

Address of welcome by President W. R. Harper, University of Chicago.

Response by Commander R. E. Peary, President of the Congress.

"The Last Uplift of the Alps," by Dr Albrecht Penck, of Vienna.

"Madagascar," by M. Guillaume Grandidier, of Paris.

"Geographic Elements," by Dr Hugh Robert Mill, of London.

"Physical Geography of Chicago," by Dr Rollin D. Salisbury, of the University of Chicago.

"Economic Geography of Chicago," by Dr J. Paul Goode, of the University of Chicago.

A buffet luncheon was served at Hutchinson Commons, at 1 o'clock, complimentary to members of the Congress.

In the afternoon, the members of the Congress were given a coach ride through Jackson and Washington Parks, stopping for a brief visit to the Field Columbian Museum, and down Grand and Michigan Boulevards, back to their headquarters at Hotel Stratford.

In the evening a reception was given the Congress at the building of the Chicago Historical Society at 8 o'clock. Mr Franklin H. Head, President of the Chicago Historical Society, gave a brief address on Salient Points in the History of Chicago.

The Congress left Chicago by their special train Sunday morning en route for St Louis. A stop for two hours was made at Vernon, so that the party might inspect the coal mine of the Madison Coal Company. Several sessions were held in St Louis in conjunction with the Congress of Arts and Science. The concluding event was a lecture by President Peary in Festival Hall, Thursday evening, September 22, where, before an audience of 4,000 people, he described some of his Arctic experiences and the plans of his next expedition.

Comparisons of the Eighth with preceding Congresses are not necessary, but it can be said with appropriateness that in the number, importance, and character of the papers presented, the Eighth holds a record. As had been expected, the membership of the Congress was not as large as that of the preceding Congresses in Europe, where geographical study is more distinct from other sciences than it is in America ; but of the 800 registered members about 500 were in attendance. About 115 had come thousands of miles, from nearly every country of Europe, South America, and Asia.

The very meeting places of the Eighth were one succession of object lessons in geography. Washington, the greatest laboratory of geographic work in the Western Hemisphere, if not in the entire world ; Philadelphia, the birthplace of the American nation ; New York, the greatest port on the Atlantic seaboard ; West Point and the Highlands, far famed for their natural beauty; Niagara Falls, one of the natural wonders of the earth ; Chicago, the marvelous inland seaport and railroad center, and finally St. Louis, the center of a system of rivers which have a navigable length of 16,000 miles and drain a territory of 1,200,000 square miles of unsurpassed richness.

Many projects were discussed. Some of them in another age might be deemed fantastic, as, for instance, Mr Lobel's plan of a Siberian-Alaskan railroad tunneling the Bering Strait ; but not many years ago if some one had proposed to send a message round the world as Admiral Chester sent the greetings of the Congress September 9, he would have been called demented. And yet the world greeting of the Congress was despatched so simply, and the replies came so instantaneously, that probably few of the large gathering at the Naval Observatory realized what a remarkable

feat was being performed, or appreciated what tremendous geographic obstacles had been overcome by man to make the practically perfect geographic unity of today.

PEARY'S PLANS FOR 1905–06.

In New York, at the subscription dinner given by the American Geographical Society of that city to the foreign delegates, Commander Peary aroused tremendous enthusiasm by stating that his North Polar expedition of 1905 was assured, and that the keel of his new ship had just been laid. It was on this occasion that the Gold Medal of the Société de Géographie of Paris was presented to him by Dr Cordier. Speaking of his vessel, Mr Peary said:

"She will, I believe, be the ablest ship that ever pointed her nose inside the Arctic or Antarctic Circle. She will possess such shape as will enable her to rise to the pressure of the ice floes and escape destruction. She will possess such strength of construction as will permit her to stand this pressure without injury. She will possess such features of bow as will enable her to smash ice in her path, and will contain such engine power as will enable her to force her way through the ice. In maximum dimensions, viz, length over all, breadth of beam, and draught, this ship will be of the size of the British Antarctic ship *Discovery;* in displacement she will be somewhat less; in power she will compare with our largest ocean-going tugs.

"My plan of campaign, in a very few words, is to force this ship to the north shores of Grant Land, taking on board at Whale Sound the pick and flower of the Esquimo tribe with whom I have worked and lived so long, to go into winter quarters on that shore, and to start with the earliest returning light on the sledge journey across the central polar pack, utilizing these Esquimos, the people whose heritage is life and work in that very region, entirely for the rank and file of my party.

"Never before has it been in the power of a white man to command the utmost efforts and fullest resources of this little tribe of people as I can do; and that fact will be of inestimable advantage to me.

"But I will not take time with details. Next summer I shall start North again after that on which I have set my heart.

"Shall I win? God knows. I hope and dream and pray that I may. But if I do not, some one else will, and here comes in another feature of polar efforts.

"There is no higher, purer field of rivalry than this Arctic and Antarctic quest.

"If I win, you will have another one of these magnificent tokens for me, and be proud because we are of one blood—the man blood. If I fail, you will try it until some one gets there, and then we shall have one of these for the man who wins, whether he bears the colors of France or England or Germany or Norway or Italy, and shall be proud of him, for we shall know he is a man and come of a nation of men, and that the best man has won."

SEARCH FOR THE LOST ISLAND OF THE PACIFIC.

James D. Hague, of New York, told the story of the search for "the reported island or islands" of the North Pacific Ocean between Hawaii and Panama. He discussed the theory that the United States sloop-of-war *Levant*, which disappeared mysteriously in 1860 on her voyage from Hawaii to Panama, may have been wrecked on an island in this neighborhood, and the possible survival of some of the ship's company. This island is supposed to be about 1,000 to 1,200 miles east-southeast from Hawaii, substantially in a direct line between the Port of Hilo and the Bay of Panama. From time to time in the early part of the nineteenth century whalers reported the existence of an island group between Hawaii and Panama. They even named two of the islands, calling them "New

Island" and "Roca Coral." Two British warships, with flags for possession purposes, went on a hunt for them in 1837 and before, but found nothing, although they reported some signs indicating that land was near by. In 1899 the *Albatross* was sent by our government to make another search. No islands were found.

"In March, 1902, Capt. Robert T. Lawless, commanding the steamship *Australia*, on his way to San Francisco from Tahiti, reported passing two patches of what no doubt was shoal water.

"This observation did much to revive interest in the question of the existence of islands in that part of the ocean.

"Certain incidental circumstances had led by chance to the revival of the generally forgotten mysterious fate of the United States sloop-of-war *Levant*, which, having sailed on September 18, 1860, from the port of Hilo, Hawaii, for the port of Panama, has never since been heard from, by any trace whatever, unless it be in certain wreckage found on the south shore of Hawaii in June, 1861, there and then identified by local authorities as wreckage from the *Levant*.

"I had the honor to bring the matter to the attention of President Roosevelt in June, 1903, and thereafter, on presentation of the known facts at the Navy Department, the Secretary of the Navy, Mr Moody, determined to send an expedition as soon as one or more suitable vessels could be spared for the service, to settle finally the question of the existence or non-existence of any shoal, reef, or island in the doubtful region.

"The newly built cruiser *Tacoma*, on her trial trip from San Francisco to Honolulu, was ordered to make a detour in that region in the latter part of May of this year. According to the report of her commander, R. F. Nicholson, search for the island was made for four days, during which neither land, shoals, nor signs of land were seen; in fact, the locality was remarkable for the total absence of birds.

"These results throw no light on the mysterious fate of the *Levant*. The ship's company might have landed without the loss of a single life, in which event there might still be some survivors, whose chances of living till now on a fairly habitable and healthy island might and perhaps have been more favorable than elsewhere.

"I may venture to recall the interesting incident that Edward Everett Hale's Philip Nolan, 'The Man Without a Country,' ended his romantic career on the *Levant* on this her last and fatal voyage. There may have been a whole ship's company of men now without a country cast away on this mysterious island nearly forty-four years ago, some of whom may be still watching for a sail. This would, indeed, be a marvelous thing, but it is not beyond the range of possibility. The mutineers of the *Bounty* lived on Pitcairn Island eighteen years before they were found there, and the extreme and solitary isolation of this supposed land would account for the long undiscovered seclusion of the castaways."

Count Joachim of Pfeil and Klein Ellguth, in speaking on "the rise and development of the German colonial possessions," told how geographers were responsible for some East African colonies.

"Many of the present German possessions were acquired without the consent of the government. In 1884 Dr C. Peters and myself took steerage passage to Zanzibar and went to what is now German East Africa. Our steerage passage was to deceive English and other Europeans. Dr Peters and Dr Juhlke returned to Berlin to persuade the government to assume formal possession of the land we acquired through treaties with native chiefs. I remained in possession. The territory we had acquired was about the size of Germany. Since the area has been doubled."

GEOGRAPHIC NOTES

PEARL AND TURTLE FARMS IN JAPAN

ONE of the most interesting addresses before the recent Congress of Arts and Sciences was made by Prof. K. Mitsukuri, of the University of Tokyo, on "The Cultivation of Marine and Fresh Water Animals in Japan." The time is fast approaching when the increase of population on the earth and the question of food supply, which must arise as a consequence, will compel us to pay most serious attention to the utilization for this purpose of what has been termed the "watery waste."

For man to overfish and then to wait for the bounty of nature to replenish, or, failing that, to seek new fishing grounds, is an act to be put in the same category with the doings of nomadic people wandering from place to place in search of pasturage. America has foreseen this and is ahead of other nations with her efficient fish commission. Nor is it from the utilitarian point only that more attention is likely to be paid in future to the cultivation of aquatic organisms. We have been apt to forget that animals are living entities and not simply a collection of dead tissues. But we are beginning to realize that animals must be studied living in order to arrive at the correct interpretation of many biological phenomena.

The speaker described the methods of cultivation of various marine and fresh-water organisms practiced in Japan. He first described the successful cultivation of the snapping turtle, which takes in Japan the place occupied by the terrapin in American gastronomy. Turtle farms in Tokyo and elsewhere are now able to raise tens of thousands of these luscious reptiles and to keep the supply constant. Methods and plans of turtle farms were described. The speaker next described the cultivation of the goldfish, which are wonderful, not only for their beauty, but are a source of endless surprises to the scientist. Various breeds were described and their extraordinary peculiarities.

The pearl-oyster farm was also described. In 1890 the speaker suggested to a Mr Mikimoto the desirability of cultivating the pearl-oyster, and also pointed out the possibility of making the pearl-oyster produce pearls by giving artificial stimuli. The idea was taken up with enthusiasm, and the results are beyond expectations. Today the pearl-oyster farm, put on a commercial basis, has millions of pearl-oysters living on the culture grounds, and is able to place annually a large crop of what has been termed "culture pearls" on the market.

THE ZIEGLER POLAR EXPEDITION

THE auxiliary steamer *Frithjof*, of the Ziegler Polar Expedition, in command of W. S. Champ, has returned to Norway after two unsuccessful attempts to reach Franz Josef Land, owing to the almost unprecedented heaviness of the ice. Mr Champ saw no traces of Captain Fiala's party. The latter are amply supplied with provisions, etc.; so that no anxiety is felt on their being compelled to spend a second winter in the north. The *Frithjof* reached latitude 79 degrees 11 seconds, which is within 40 miles of Cape Flora. Mr Champ says in a letter to the National Geographic Society, which it will be remembered has a special representative with the expedition in the person of W. J. Peters, of the U. S. Geological Survey, who is second in command and director of the scientific work of the party:

"In accordance with the plan of the expedition, Mr Fiala was to put down signals for us at this cape (Flora) on his northward voyage last year and again this past spring. It was also included in the plan to send down a light sled

party with full information as to where the *America* wintered and what had been accomplished during the winter and the first part of the spring. Unfortunately, as above stated, we were unable to connect with this party or reach land. A most careful watch was kept aboard the *Frithjof* both night and day for any trace or sign of the expedition, but nothing whatever was found during the entire period which we spent in the ice.

"I have every reason to believe that the *America* reached Franz Josef Land last year, that winter quarters was established, and that the sledge journey was made this spring. Of course, I have no absolute knowledge that such was the case, but am strongly convinced that the original plans have been carried out.

"We have no anxiety as to the welfare of the men other than the natural chances that all explorers take in such a perilous undertaking. The expedition has been thoroughly equipped and has an abundance of food. In addition to what they carried last year, they have additional large stores to fall back upon in case of necessity in several camps or depots in Franz Josef Land Archipelago. In addition to the food, they are thoroughly equipped to kill game, which abound in that country during certain periods of the year.

"All the mail sent to the members of the expedition, and which was carried by the writer, has been placed in hermetically sealed tins and deposited in the Tromsoe Private Bank.

"It is Mr Ziegler's intention to send out a strong vessel next year for the purpose of continuing the work and reaching the members now in the field."

THE CHAGRES RIVER

THE Chief Engineer of the Panama Canal, J. F. Wallace, has announced that the problem of how to handle the waters of the Chagres River has been solved by a party of American engineers, who have found a way of diverting the waters of the Chagres River into the Pacific Ocean. What to do with the turbulent floods of the Chagres River has hitherto been the most perplexing question which confronted the engineers. The most feasible solutions, until now, had been either to build an enormous dam and spillway costing many millions of dollars, and even then not satisfactory, or to dig a channel 600 feet wide and 40 feet deep. Mr. Wallace estimates that by diverting the river to the Pacific by this newly discovered route at least $20,000,000 will be saved over the previous plans.

Mr. Wallace states that the expedition which found the new waterway was led by Engineer George Ehle. Mr. Ehle has been in Panama three or four years. Four months ago he, with a party of young American engineers, most of them just out of college, was sent to explore the headwaters of the Chagres River. They were abandoned in the tropical jungle by their native helpers, and had to carry on their backs the packs that the natives had abandoned. They cut their way foot by foot through the dense tropical growth along the river. They had maps that had been made by the French engineers, but they found rivers where none were indicated on the maps, and found none where they were indicated. About twelve miles from the canal they found a river on the Pacific slope of the mountains not platted on the maps, by which the waters of the Chagres can be carried to the Pacific Ocean.

The Isthmus of Panama.—When the present able sanitary corps which has charge of bettering the health conditions in the isthmus has carried out its plans for the improvement of the canal strip and the cities of Panama and Colon, there is no reason why the isthmus should not be one of the healthiest places in the world, is the opinion of U. S. Minister John Barrett, of Panama, expressed in a recent report. Mr Bar-

rett continues: "As a matter of fact, there has not been during the months of July and August a single uncomfortable night for sleeping, while the average days have not been hotter than those of New York and Washington. There has been hardly a single instance of serious illness among the considerable number of young men employed here in work connected with the canal, while the percentage of sickness among the larger group of laborers employed at Culebra is not greater than among those engaged in similar excavating work in the United States. Among the 400 marines located half way across the isthmus, at Empire, there has not been a single death from local diseases, while the percentage of those in the hospital is not larger than would be found at the average post in the United States. There has not been a single case of yellow fever for over a month, and there is less malaria than is often found in sections of the United States. The worst portions of the cities of Panama and Colon are much cleaner and more wholesome than the slums of our North American cities, and are far ahead of the average Asiatic city of the tropics."

The Commercial Importance of the State of New York was aptly summarized in a recent address made by George R. Malby as follows: The value of the annual manufactured products of the Russian Empire, or of Spain, or of Belgium, or of many other European countries is much less than that of New York, while our foreign trade exceeds that of every other country in the world, except Great Britain, France, Germany, and the Netherlands. It is 50 per cent larger than Russia's, three times as great as Canada's, four times as great as Spain's, and more than four times as great as the mighty Empire of Japan.

The bank clearings of the city of New York alone have distanced every continental center, and passed even London itself. Our savings bank resources amount to $1,238,000,000, which is a sum larger than that deposited by the citizens of any country in the world except Germany alone, while the aggregate wealth of only a few of the larger European countries, with many times the population, outranks the Empire State, which has nearly doubled during the past ten years.

Conditions in Manchuria.—Under date of August 15 the American consul, Mr Miller, at Niuchwang, has transmitted to the State Department an interesting report of conditions in Manchuria.

The crops in the Liao Valley bade fair to be first-class, and a bountiful crop would be harvested there and in all of southern Manchuria and in northern China. This made for peace as far as the Chinese were concerned. An important fact is the poor condition of the crops in the Sungari Valley, where the wheat is grown with which the flour mills of Harbin are supplied. These mills were idle, having used up all of last year's crop, and this year's crop was so poor that they can not possibly secure grain enough to operate more than half time. Hence the Russian army must depend for its supplies upon a single line of single-track railway, while heretofore it has been able to gather vast amounts of provisions in forage in the country.

The number of immigrants entering the United States in the fiscal year ending June 30, 1904, was 812,870. This is a larger record than that of any year except 1903, when the total was nearly 55,000 greater. Of Austro-Hungarians there was a decrease of 28,855, of Italians 37,326, of Swedes 18,265, and of Japanese 5,704, while there was an increase of Germans 6,294, of Russians and Finns 9,048, of English 12,407, and of Scotch 4,949. Italy sent over 193,296, Austria-Hungary 177,156, Russian Empire and Finland 145,141, Germany 46,380, and England and Ireland 74,768.

ABSTRACTS OF CONGRESS PAPERS

A PROJECT FOR THE EXPLORATION OF THE ATMOSPHERE OVER THE TROPICAL OCEANS

BY A. LAWRENCE ROTCH, DIRECTOR OF BLUE HILL METEOROLOGICAL OBSERVATORY, MASSACHUSETTS, U. S. A.

In 1901 the writer first demonstrated that kites might be flown from a steam vessel independently of the natural wind, and showed that meteorological data could be obtained in this way under conditions and in places hitherto unexplored. Such a region lies above the equatorial oceans, where we know very little about the thickness of the trade-winds or concerning the direction and force of the superposed anti-trades and where we have no knowledge of the vertical variation of temperature and humidity nor whether there is a sudden change in these elements between the trades and the anti-trades.

Starting from the United States in July, the itinerary of a steamer equipped with kites for atmospheric soundings should be northeast across the Atlantic, then southwest to the Azores and by way of Madeira to Teneriffe; thence with the northeast trades and through the doldrums to the South American coast and against the southeast trades to Ascension, returning by a route somewhat more easterly at first and then more westerly. Soundings in these latitudes up to a height of two or three miles would help to solve some of the most important problems in meteorology and physical geography.

To charter and keep in commission for several months a properly equipped vessel would cost about $20,000, and the writer made an unsuccessful application to the Carnegie Institution for a grant to defray a portion of this expense. The investigation is certain to be undertaken before long, but it ought to be done by Americans, who have developed the kite as a meteorological instrument, and the writer is still hoping to carry out the project which he was the first to propose.

THE BEARING OF PHYSIOGRAPHY UPON SUESS' THEORIES

BY WM. M. DAVIS, HARVARD UNIVERSITY

Suess has announced his conviction that plateaus or horsts gain their altitude with respect to neighboring lower lands, not by their own local uplift, but by the depression of their surroundings. The evidence for this conviction is not a direct demonstration of the depression of the lower lands, but an indirect argument based on the difficulty of accounting for the forces needed to produce local uplifts. In his great work, Das Antlitz der Erde, this distinguished geologist does not directly inquire into the altitude that various plateaus had with respect to sea-level before the occurrence of the displacement by which their present altitude was gained, but it is implied that both the plateau areas and the surrounding areas formerly stood at (or about) the present altitude of the plateaus, and that the depression of the surroundings necessary to leave the plateaus in relief was limited to the neighboring areas of now lower lands.

It appears, however, that many plateaus referred to by Suess were formerly peneplains, and hence that they once stood close to sea-level. It follows that if the present altitude of such plateaus was gained by the depression of their surroundings, then not only the neighboring lower lands, but all the oceans of the world and all their associated low-lands must also have been depressed by the full measure of the altitude gained by the former peneplains. It may be impossible to disprove these wholesale movements of depression, but it is desirable to recognize their areal magnitude Until direct evidence of the occurrence of depression is found it seems more reasonable to regard the present altitude of plateaus that were once peneplains as due to local uplifts, whether in our abundant ignorance of the earth's interior processes we can explain local uplifts or not.

THE CHRONOMETER AND TIME SERVICE OF THE U. S. NAVAL OBSERVATORY AND THE PRESENT STATUS OF STANDARD TIME

BY LIEUT. COMDR. EDWARD EVERETT HAYDEN, U. S. N.

This department of the observatory has charge of all naval chronometers and of the daily telegraphic time signals. There are in all about 700 chronometers used to obtain longitudes of vessels and in ocean and lake surveys. These are tested at the observatory, their errors and rates being ascertained by astronomical observations with a transit instrument in connection with standard clocks and chronographs and a temperature room in which continuous high, medium, and low temperatures can be maintained. Telegraphic time signals are sent out at noon daily, except Sundays and holidays, and transmitted throughout the country by the telegraph and telephone companies without cost to the government or to the people. A special New Year's eve time signal sent out on December 31, 1903, traversed some

300,000 miles of wire. It reached Greenwich, England, in 1.33 seconds; the City of Mexico in 0.11; Lick Observatory, California, in 0.05; Sydney, Australia, in 3.50, and Wellington, New Zealand, in 4.00. The United States adopted standard time on November 18, 1883, and thus did away forever with the confusion incident to the use of local mean time. The hour meridians used are 75°, 90°, 105°, and 120° west from Greenwich, designated respectively as eastern, central, mountain, and Pacific standard time. The same system has been adopted in our insular possessions and Alaska It is in use also in practically all of Europe except France, Russia, and Ireland; in Egypt, South Africa, Canada, Australia, and New Zealand, and in Japan and Korea. France, including Tunis and Algiers, uses standard time of the meridian of Paris; Greece, that of Athens; Argentina, of Cordoba; Ecuador, of Quito; Cuba, of Havana, and Ireland, of Dublin In India, Madras time is used very generally by the railroads and telegraphs, but it is usually converted into local mean time for local use. The simplicity and convenience of having the same common standard everywhere are so great in all international relations, the conversion of one time into another thus involving hours only, the minutes and seconds being always the same, that it is hoped soon to have the Greenwich system adopted universally.

THE DESTRUCTION OF POMPEII AS INTERPRETED BY THE VOLCANIC ERUPTIONS OF MARTINIQUE

BY ANGELO HEILPRIN

The eruptions of Pelée throw new light upon the first recorded eruption of Vesuvius, and render intelligible those passages in the Pliny narration which have heretofore been obscure and thought to be opposed by the facts of geology. The "horrible black cloud," scintillating with serpent-flashes of lightning, which is described as rolling *down* the mountain slope and blotting out the landscape, is seemingly the absolute counterpart of the great descending black cloud, similarly charged with electricity, which was the distinctive feature of the Pelée eruption of May 8, 1902. It was manifestly with the issuance of this cloud that Pompeii was destroyed, which was, therefore, on August 25 (not 24th, as generally stated by historians), A D. 79, as Pliny's narration makes clear that this climax of activity was reached on the second day of the eruption of Vesuvius. The speaker expressed his conviction that Pompeii was not destroyed as the result of simple incineration, as is generally assumed by geologists and others, but in a manner in all probability closely similar to that which annihilated St. Pierre. The numerous deformed objects of porcelain, glass, etc., which, as recovered from Pompeii, were thought to represent long periods of time effecting their deformation, have again their exact counterpart in objects recovered from St. Pierre, where the deformation was accomplished in minutes or seconds.

GAME AND FUR-BEARING ANIMALS AND THEIR INFLUENCE ON THE INDIAN OF THE NORTHWEST

BY TOWNSEND W. THORNDIKE, M. D.

Southward of Hudson Bay and the Canadian barren-lands there lies a vast tract of swampy territory, known as the "Muskeg region." The industrial and commercial outlook for this great stretch of watery lowlands is not encouraging. Ventures in mining, lumbering, and agriculture, even if possible, are most remote. Under these conditions to what profitable purpose may this apparently worthless area be put? Nature has shown us. She has made it a most remarkable breeding ground and abode for many of the valuable game and fur-bearing animals.

Thus guided by nature it is obvious that the duty of the government should be to set aside this Muskeg territory and establish preserves for the propagation of these animals. In this way an economic future of the land will be assured by the resulting development of a permanent fur trade.

Such preserves, besides affording protection to the animals, will give to the Indian inhabitants of the region advantages of the greatest possible benefit in relation to their social and industrial status.

This influence of animal life on the red man has curiously enough been only slightly touched upon by writers, and this is the more astonishing when we reflect upon the role that the wild animal has played in the development of the Indian. Broadly speaking, it can be said that the beasts of the forests and fields are the foundations upon which rest the manners, customs, and characteristics of the North American Indian.

The fact that this influence has never been appreciated is, I believe, one of the chief reasons for failures in our Indian policy.

In the United States it is too late to make a change in the conduct of our Indian affairs. In northern Canada the situation is better, and government action would be rewarded by an increased producing power of a territory rapidly becoming valueless; by the regeneration of a fine type of Indians carrying on their natural occupation of hunting, and independent of state aid, and by the disappearance of the fear of extinction of animal life.

The Philippine Islands. 1493-1898. Vol. XVIII. 1617-1620. By Emma Helen Blair and James Alexander Robertson. Pp. 346. 6 by 9½ inches. Cleveland: Arthur H. Clarke Co. 1904.

We can understand present conditions in the Philippines only as we are acquainted with the past. Very fortunately for us and the Philippines, this past history, which has been almost completely hidden from the world, is now being brought to light in the splendid series of volumes edited by Miss Blair and Mr. Robertson. The great importance of the series and its inestimable value to the student of affairs in the Philippines become more apparent with each succeeding volume; the American people, who wish to thoroughly understand the islands and the Filipinos themselves, are under immense obligations to the publishers and editors. The scholarly manner in which the volumes are edited and the clear and permanent character of the printing and paper make the series complete and attractive.

The scope of the present volume extends from 1617 to 1620. The islands are still ravaged at intervals by the Moro pirates from the southern part of the archipelago. Even worse are the losses to the commerce of the islands inflicted by the Dutch. Their ships infest the seas about Luzon, and those of the Moluccas, in which region they are steadily and even rapidly gaining foothold, and securing the best commerce of those islands. Corruption in the management of the Spanish interests in the Spice Islands renders them an expensive and embarrassing possession, and the new governor, Fajardo, finds the same influence at work in the Spanish colony itself, especially among the auditors and other high officials. The colonial treasury is, as usual, short of funds, and can do little to defend the islands from the Dutch. The Madrid Government is unwilling to spend much more on the Philippines, although beset with importunities to save that colony, and Spanish commerce generally, from the insolent Dutch. The usual building of ships in the islands has so harassed and exhausted the unfortunate natives that it is necessary to have ships built for the Philippines in India and other countries where time and labor are more abundant.

BOOKS RECEIVED.

Great American Canals. Vol. I. The Chesapeake and Ohio Canal and the Pennsylvania Canal. By A. B. Hulbert. With maps and illustrations. Pp. 232. 5½ by 7½ inches. Cleveland: Arthur H. Clarke Co. 1904.

The South American Republics. Part two: Peru, Chile, Bolivia, Ecuador, Venezuela, Colombia, Panama. By Thomas C. Dawson. With maps and illustrations. Pp. 513. 5½ by 8 inches. New York: G. P. Putnam's Sons. 1904.

Sweden. Its people and its industry. Historical and Statistical Handbook. By Gustav Sundbarg. With numerous illustrations. Pp. 1106. 6½ by 9½ inches. Stockholm: P. A. Nordstedt & Soner. 1904.

The Norwegian North Polar Expedition, 1893–1896. Vol. IV. Scientific results. By Fridtjof Nansen. With diagrams and charts. Pp. 231. 9 by 11½ inches. New York: Longmans, Green & Co. 1904.

Africa from South to North through Morotseland. By Major A. St H. Gibbons. Two Vols. With maps and many illustrations. Pp. 290 + 296. 6 by 9 inches. New York and London: John Lane. 1904.

De La Côte D'Ivoire au Soudan et a La Guinée. Par Le Capitaine D'Ollone. With maps and many illustrations. Troisième Edition. Pp. 311. 6½ by 10 inches. Paris: Librairie Hatchette et Cie. 1901.

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The NATIONAL GEOGRAPHIC MAGAZINE

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THE NATIONAL GEOGRAPHIC MAGAZINE

THE NEW ENGLISH PROVINCE OF NORTHERN NIGERIA

THE attention of the world has been focussed so sharply during the last five years on South Africa, the Philippines, and the Far East that the remarkable extension of British control over northern Nigeria, a territory of 500,000 square miles and containing a population of 20,000,000, has passed completely unnoticed. This extension has been made by Sir Frederick D. Lugard, British high commissioner to northern Nigeria, assisted by a few score white men and at an annual expense of about $2,000,000. Organized slave raiding and flourishing slave markets have been stopped, and it is believed a productive and rich commercial field opened to English capital. The fact that northern Nigeria is almost the only part of British tropical Africa which possesses a history extending over many centuries and a semi-civilization of its own long antedating the coming of the European give the region unique interest. Sir Frederick Lugard has recently given a report of his work,* including an account of the history of the province, from which the following notes are quoted in his own words:

The British force, consisting of 50 whites and 700 native troops, reached Kano (which is about 600 miles inland from Lagos) in February, 1903, and faced the stupendous walls, 30 to 50 feet high and 40 feet thick at the base, with a double ditch in front. Their perimeter was 11 miles, with 13 gates set each in a massive entrance tower. A small breach was made by our guns, and a storming party charged, under Lieutenant Dyer. The determined nature of the assault, and the prestige our troops had gained, and the effect of our shells combined to dissipate the courage of the defendants. Their leisurely retreat was changed into a panic-stricken rout by the charge of the mounted infantry. The town lies at the further end of the *enceinte*, inclosed by walls, and a distance of 1½ miles separated it from the scene of the fighting; so that no one was hurt except the actual combatants, and no damage whatever was done to the city. The troops marched to the king's inclosure, itself no mean citadel, covering 33 acres of ground. Sentries were posted at the gates, and no man was allowed to go out with

* An address before the Royal Geographical Society, published in the Geographical Journal of London.

arms, so that no friction might occur and no violence be perpetrated in the town. Later three soldiers did manage to break out and kill a man in a quarrel in the market. The murderer was tried by court-martial and shot, and I desired that one or two of the Kano chiefs should be witnesses of this vindication of British justice. In the arsenal was found every conceivable kind of ammunition and a great quantity of powder. About 20,000 rounds were destroyed and 350 firearms. Within three days of our occupation three large caravans left for the south, and the great market was in full swing, as though nothing had happened.

I had myself joined the force after the capture of Kano, marching up from Zungeru by the wonderful caravan road which leads through Zaria. I have seen nothing like it in Africa. The track is often 50 feet wide, and one meets ceaseless caravans of laden donkeys, men, women, and live stock along its whole length. I must have passed many thousands in the 250 miles we traversed to Kano. Between Zaria and Kano the road is frequently inclosed between hedges of great age, a very striking contrast to the universal bush path of Africa. The road leads for the most part through cultivation and villages. The method of cultivation is more thorough and more advanced than is usual in Africa. The soil is worked to a depth of over a foot, and here and there rude forms of irrigation are employed, while for the first time in Africa I saw with surprise that the fields are manured. The tamarind, the Dum palm, the acacia, and the Adansonia take the place of the shea, copaiba, and the locust trees of the south.

THE CITY OF KANO

Kano alone, among the cities of Africa which I have seen, with the exception of Katsena, is worthy of the name of city, for its houses are of solid mud, with flat roofs impervious to fire, and lasting through the centuries, instead of the beehive-shaped huts of the populous towns of the south. Traces of Moorish architecture are visible everywhere, and the horseshoe arch, which some writers assert was introduced by the Arabs from Syria and Mesopotamia, modified by the Berbers and Egyptians, is a feature of the buildings.

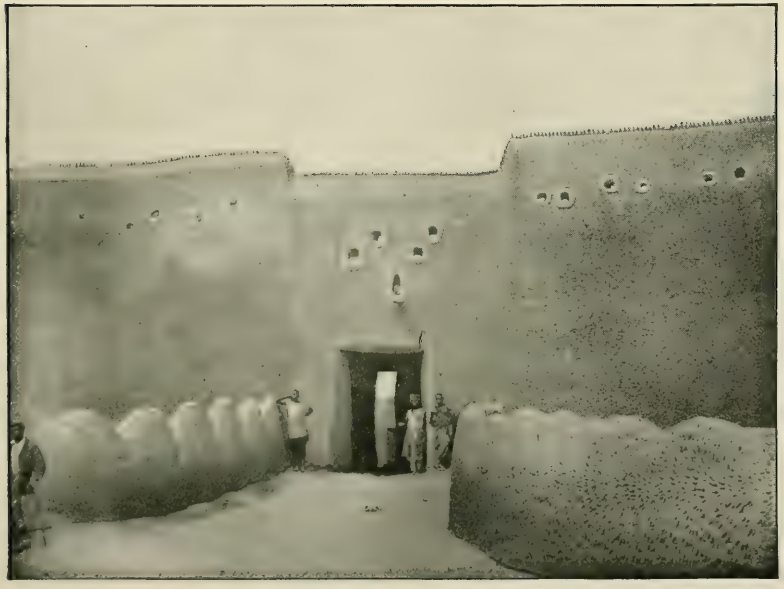
I took up my quarters in the small hall of audience, a room 25 feet square, 18 feet high, decorated with quaint shapes and designs in black, with pale green and yellow—the latter formed of micaceous sand, which glistens like gold. The dome-shaped roof is supported by twenty arches, all of mud, but admirably fashioned, and converging on the center. The photo (see page 439) will give you a better idea of its structure than my words can convey. Kano thus marks the limit of the northern type of building, of which only occasional reminiscences are seen in some emir or chief's house in Zaria and Bida. Admirable in design as were the great houses of the king and chiefs of Uganda before the Pax Britannica taught the people to prefer architecture of the railway-shed pattern, they were but of grass and palm stems, which a fire would destroy in a night; but the greatest fire would leave Kano intact as a city.

The city is divided, like all others in Nigeria, into quarters where the different races congregate, and it is striking to see white-faced Tripoli merchants with their wares of tea and sugar, silk and spices, in the Arab quarter of this African city.

There are large open spaces everywhere in Kano, each with its enormous hole of reeking sewage, from whence the clay has been dug to build the houses. Unlike Bida, which, as you approach it, looks like a forest, Kano is almost treeless. Over these bare spaces sweeps the dusty wind, and on the margins of the great holes or stag-

View of Kano from the Dallah Hill

For this and succeeding pictures of Kano the NATIONAL GEOGRAPHIC MAGAZINE is indebted to the *Geographical Journal* of London



A Kano Gate

The Emir of Kano's Palace

Interior of Native Emir's Palace

nant tanks the vultures fight for the carcase of some dead dog or the stray leg of a bygone fowl.

The great market is said to contain a floating population of 30,000 persons, and camels, horses, asses, oxen, and goats are exposed for sale. Tripoli merchants, Asbenawa from the desert, Salaga merchants from the Gold Coast, and Hausas each sell their own particular class of wares. I would linger here and describe to you this interesting town, the nature of the trade, and the history of its people, but I must pass on with my narrative. Suffice it to say that in an Arabic document obtained by Mr Wallace some years ago, I find that the history of 42 kings of Kano is given, covering a period of 768 years. The manuscript breaks off suddenly, and it is not possible to fix with accuracy the date of the events it records, but the last king is probably identical with the man whom the Fulani ousted, which would carry back the history to 1040 A. D.

THE EMIR'S DUNGEON AT KANO

The dungeon at Kano was an incredible horror. A doorway 2 feet 6 inches by 1 foot 6 inches gives access into it. The interior is divided (by a thick mud wall with a similar hole through it) into two compartments, each 17 feet by 7 feet and 11 feet high. This wall was pierced with holes at its base, through which the legs of those sentenced to death were thrust up to the thigh, and they were left to be trodden on by the mass of other prisoners till they died of thirst and starvation. The place is entirely air-tight and unventilated, except for the one small doorway, or rather hole, through which you creep . The total space inside is 2,618 cubic feet, and at the time we took Kano 135 human beings were confined here each night, being let out during the day to cook their food, etc., in a small adjoining area. Recently as many as 200 have been interned at one time. As the superficial ground area was only 238 square feet, there was not, of course, even standing room. Victims were crushed to death every night, and their corpses were hauled out each morning. The stench, I am told, inside the place when Colonel Morland visited it was intolerable, though it was empty, and when I myself went inside three weeks later the effluvia was unbearable for more than a few seconds. A putrid corpse even then lay near the doorway. Even the memories of the Black Hole of Calcutta can not eclipse this plain statement of the state of things in a British protectorate in the twentieth century, of which, in general terms, I have long been aware. One of the great pools of the city is marked as the place where men's heads were cut off at the arbitrary order of the king; another, near the great market, is the site where limbs were amputated almost daily for theft or some less real crime.

THE BRITISH ADMINISTRATION

The aim of our government has been to rule through the native chiefs, and, while checking the extortionate levies of the past, to fairly assess and to enforce the ancient tribute. By this means a fair revenue will be assured to the emirs in lieu of their former source of wealth, which consisted in slaves and slave raiding and in extortionate taxes on trade. A couple of years ago there was not, I suppose, in Africa any country in which slave raiding was carried on to the extent which it was in northern Nigeria. Regular armies took the field each dry season, and the country had become depopulated. Ruined towns met the eye in every direction. The currency of the country consisted of slaves and cowrie. All this is now a thing of the past.

The country has been divided into sixteen provinces, coinciding as nearly as may be with existing emirates and tribal divisions. Each resident-in-charge will be assisted by two political officers and

a police officer, with fifty native constables, and in most of the provinces there is also a medical officer and a military garrison. With such a staff of zealous and able officers the administration will, I hope, be fairly effective, though it is none too large to deal with all administrative questions, to collect revenue, compile statistics of population, etc., to carry on the judicial work of the British courts and to supervise the native courts, to carry out the surveys, to superintend the road-making and other public works, and to develop the economic resources and trade.

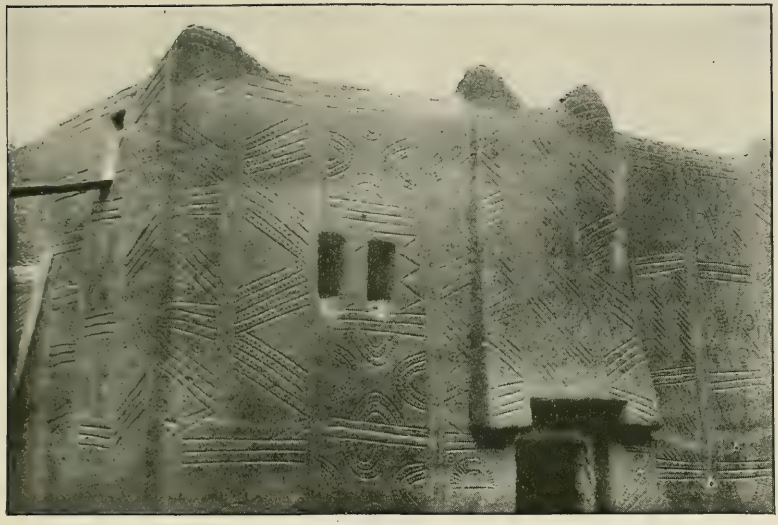
THE PEOPLE OF NIGERIA

The Mohammedan Fulani, though the ruling race, form but a very small item in the population of northern Nigeria. The indigenous people, who are subject to them, are of many different tribes. In the northern states of Sokoto, Kano, Zaria, and Hadeija they are chiefly Hausas. South of these are the great Nupe tribe, and south again in Illorin are the Yorubas. Of these the Hausas are the most considerable. They are found as settlers and traders in every province, and even as far as Sierra Leone and the Gold Coast. Their language is the *lingua franca* of northern Nigeria, especially of trade, and their keen commercial instincts have earned for them the name of "the business men of west Africa." They make admirable soldiers and are brave and reliable, but probably inferior in mental ability and alertness to either the Nupes or Yorubas. The latter are hardly less keen traders than the Hausas, at least equally industrious and much quicker to learn, though hardly equal to them in stolid pluck. The Nupes are the finest of the three in physique and very intelligent, but they have not the pluck of the others, and their ability is apt to degenerate into cunning treachery and falsehood. These tribes have to some extent embraced the faith of Islam, especially the Hausas. There are other great tribes who are pagans.

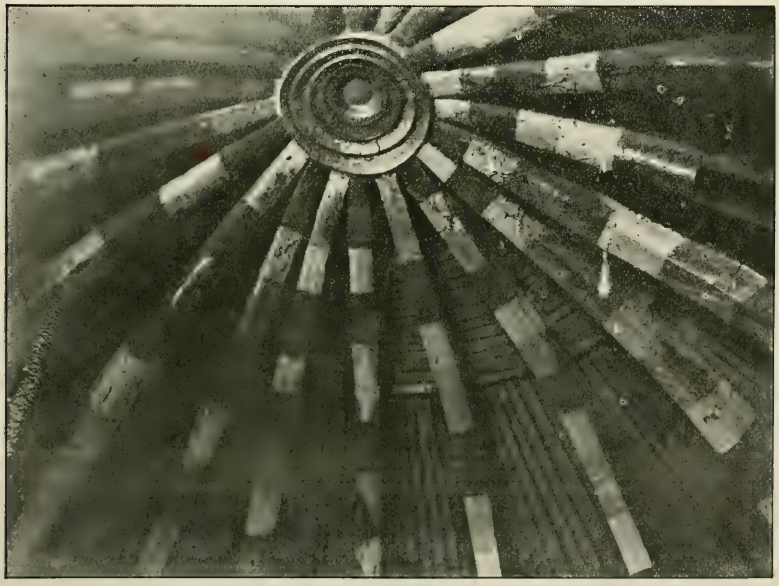
CLIMATE AND HEALTH CONDITIONS

Nigeria is a land of tornadoes. Toward the close of the dry season—end of February—cyclones from the northeast, usually accompanied by storms of thunder and rain, burst with great fury. Increasing in frequency, they merge into the heavy rains which last from July to October. With the cessation of the rains the whole Sudan presents a vista of grass fires, and the Hamattan wind begins to blow from the northeast. The clear atmosphere of the rainy season gives place to a thick haze, which like a London fog obscures the whole horizon, and objects only a few hundred yards distant are indiscernible, so that surveying is difficult. The sun disappears like a crimson disk about 5 p. m., behind this pall of haze, which consists chiefly of impalpable dust. The so-called Tuareg "veil," and the habit of wearing the pugari over the mouth and eyes, is adopted as a protection against this dust. The wind itself blows intermittently for several days with violence, and anon with moderate force or abates altogether, but always from the same quarter, especially betweem 8 a. m. and 4 p. m.

The Hamattan is the herald of cold nights, and in the northern states even during the day, in the months of January and February, the cold is often quite trying. The excessive dryness of this wind from the desert of the Sahara causes an evaporation when it meets the wall of humid atmosphere in the Niger Valley and produces these effects of cold. Where the lakes around Timbuktu and the waters of Chad impinge on the desert, I am told that frost is not uncommon. These cool nights add to the health and comfort of Europeans, and though the Niger Valley is undoubtedly trying I think that the health conditions of the interior are good, and will im-



Exterior of the Emir of Kano's Harem



Ceiling of the Emir of Kano's Audience Chamber

View Inside Zaria

Wall of Emir of Zaria's Compound

prove greatly as our resources enable us to build proper houses and to transport the necessaries for European life and comfort. *Even what we have already been able to do has reduced the mortality from 32 per cent in 1898 to 6 in 1901; deaths and invalidings, 87 per cent to 34 per cent.*

DISAPPEARANCE OF LAKES AND RIVERS

But other causes still, besides the sand-bearing Hamattan and the deforestation of the country, are at work to effect the diminution of the rivers and the lakes of Africa. Lake Ngami, whose waves were so great that they are said to have dashed hippopotami to pieces when Livingstone discovered it in 1850, was when I lived near it in 1896 only a dry bed of the smouldering ashes of lacustrine vegetation, while the Home River and the upper Botletle were both dry and their channels hardly distinguishable. In every direction were abandoned wells. Year by year they had to be deepened to catch the failing supply of water, till it ceased. Three times in a few years had the chief of the Tawana to shift his capital because the apparently inexhaustible supply had wholly failed at each turn. In Nyassaland, as I have pointed out in former writings, the old surface level of the lake may be seen far inland today, and it is possible to trace various different levels on the surface of the water-worn rocks; and so it is in West Africa.

View of the Niger from Jebba

Yearly the Niger becomes less navigable. Where steamers drawing 8 feet could ascend within the memory of Mr Wallace (now deputy high commissioner), 3-feet vessels can now with difficulty make their way for a much more limited period. As the lips of the rapids and waterfalls are worn away in the course of time and the obstructing rocks are eroded, the rivers will, of course, run off their volume of water more rapidly to the sea; but this is a process of ages,

and it remains to assign the cause for so great a decrease in the rainfall or such other causes as may have combined to produce these results.

COMMERCIAL POSSIBILITIES

The great need of the country is transportation facilities. If a narrow-gauge tramway was built connecting the interior with the great waterways, Nigeria might become one of the cotton-producing centers of the empire, and her great population might afford a new and important market for the manufactured cottons of Manchester. Without such cheap transport, however, neither cotton nor other agricultural or sylvan produce can bear the cost of carriage from the interior, where the bulk of the industrious population live.

The principal exports at present are shea, rubber, palm kernels, ivory, gum and wood oils. The imports are chiefly cottons and salt, since liquor for sale to the natives is entirely excluded.

If a cheap form of transport was introduced, the existing imports, at present simply wasted for lack of transport, might be almost indefinitely increased, and many new products could be profitably exploited. Prominently among the latter would be cotton, for which there is so great a demand in England and which has been grown for 1,000 years in the Hausa states. Minerals, too, will soon become a profitable source of revenue. The mines at Bauchi have proved to be of the highest quality, and they are now being exploited by the Niger Company.

The local industries and manufactures are varied, and the products are often of high excellence. The weavers of Kano and the other great cities produce admirable cloth, colored by the native dyers with their own fast dyes. The leather work is admirable, and the tanned goat skins exported from Kano across the desert to Morocco were the original Morocco leather of commerce.

SCIENTIFIC WORK OF MOUNT WEATHER METEOROLOGICAL RESEARCH OBSERVATORY*

BY PROFESSOR FRANK H. BIGELOW, U. S. WEATHER BUREAU

METEOROLOGY has for its field of study the physics of the earth's atmosphere. Since all stellar and planetary atmospheres are subject to similar laws, meteorology properly is concerned with astrophysical and solar physical problems as well as with terrestrial atmospheric relations. Cosmical meteorology may be used as a term to designate the mutual relations between solar and terrestrial atmospheric physics. The causes of the circulation of the earth's atmosphere are intimately bound up with the causes of the circulation of the sun's atmosphere. The generation of the great cyclonic circulation in the earth's atmosphere covering a hemisphere is due to the sun's radiation falling upon the tropics, and the tendency to return to a thermal equilibrium is accompanied by the production of local cyclones and anticyclones in the middle latitudes of the northern and southern hemispheres. Similarly, the sun's own circulation can be divided into a general drift over the hemisphere and

* An address to the Eighth International Geographic Congress.

a series of minor or local gyrations in different latitudes. We have shown in a paper that three aspects of one common law of general motion are mathematically competent to account for the three typical drifts, within which the local storms occur as secondary phenomena. The solar energy pours forth in several types of radiation, and these are accompanied by various kinds of surface phenomena which are subject to our observation. Their interpretation is to be made in terms of the general solar action, and they are to be treated as pulses or symptoms of the great operations inside the solar surface, whose laws can be discovered only by inference and mathematical analysis. The immediate signs of the internal solar action are the frequency of the occurrence of the black spotted areas which vary from year to year, the relative abundance of the faculæ and the flocculi, the granulations of the photosphere, the numerical frequency of the hydrogen and calcium prominences which are projected to considerable distances above the disk, and in the form and extent of the solar corona. We now know that the period of rotation in different zones and the frequency of all these phenomena vary from year to year in at least three fundamental cycles, whose lengths are respectively about thirty-five years, eleven years, and three years. The records disclose two or three thirty-five-year cycles, more than twenty eleven-year cycles, and a great number of three-year cycles. We have in hand the typical annual curves of these in about all the phenomena mentioned, and they certainly constitute a single homogeneous system, as they apparently ought to do, since they are various kinds of registers of the same solar action.

Beyond the surface of the sun there are several types of radiation which transport the solar energy into distant cosmical spaces. The most conspicuous is the electro-magnetic radiation, whose energy is practically confined to wave lengths from 0.35 μ to 2.50 μ, of which the waves up to 0.8 μ are visible, while all the others are invisible to the human eye. The other waves, ultra violet and infra red, are detected through appropriate physical observations, by photography, bolometry, and by spectroscopy. There are also generated at the surface of the sun certain electrical radiations, like the cathode rays in a vacuum tube where positive and negative charges of electricity are transported by ions into space, and these are seen in the long coronal streamers, possibly also in the zodiacal light at the earth. There are weighty reasons for thinking that the sun, like the earth, though having a very high interior temperature, yet sustains a magnetic field which embraces the earth in its operations.

At the earth the effect of these solar forces is registered by the changes observed in the aurora and the magnetic elements. The solar annual curve, which is conspicuously found in the prominences, is reproduced in the earth's magnetic field. It is also found in various portions of the earth to reappear in the barometric pressure and temperature, in the rainfall and the intensity of storms. This signifies that the changes in the internal circulation of the sun reach over to the earth and induce synchronous changes in the circulation of our atmosphere. The several impulses mentioned, whether solar or terrestrial, throughout which this synchronism has been traced, are merely symptoms of the great cosmical circulation extending from the sun out into space and involving the planets more or less vigorously. The earth is near enough to the sun to feel the changes of the solar circulation in a very definite manner. There are a few hundredths of an inch of annual pressure involved and two or three degrees of temperature are concerned.

When we consider that the annual values are made up of a great number

of short oscillations of the atmospheric conditions at a station, we have the means for interpreting them in terms of climate. The amplitudes of the pressure and temperature oscillations change decidedly from one year to another, and we note the result popularly by the fact that one winter is cold and the next warm, one summer dry and another moist. These practical results are always accompanied by certain changes in the normal conditions—that is to say, their departures from the normal or average state of the temperature. We now know that some countries are favorable and some unfavorable for recording the solar variations in terms of meteorological changes. Generally the plateau and mountainous regions are not as well adapted as the low-level or oceanic areas to feel this solar impulse without mixing it up with the other motions of the atmosphere and burying it in them. Thus Asia is not favorable, Europe and Africa are somewhat better, while North and South America, the Indian Ocean, and Australia are the most sensitive areas for making the records. The small ocean islands, Mauritius, Azores, Hawaii, etc., seem to be most suitable for this solar registration. This is, no doubt, due to the fact that the ocean-island climates are less disturbed than the continental, where the mountain ranges exercise a great influence upon the circulation of the lower strata of the atmosphere. Thus the Himalaya Mountains, stretching east and west, shield the continent of Asia from cyclonic action, while the Andes and the Rocky Mountains, stretching north and south, are favorable for producing local storms in North and South America. The Indian Ocean records the solar impulse by reason of the quiescence of the atmosphere over it, while the United States records it in another way by reason of the activity of the circulation traversing it. This region has many more storms than other portions of the earth, and that is why meteorology has a special duty to perform for science in the United States by reason of its active field, which favors a proper study of the fundamental problems.

Enough has been accomplished in the way of establishing the fact of this solar-terrestrial synchronism to justify scientific men in all portions of the earth devoting their best energies to a further elucidation of all the facts. The range of work is enormous, since it involves so many lines of correlated subjects in solar physics, terrestrial magnetism, and meteorology.

The International Meteorological Committee is about to organize a strong attack upon the cosmical problem by enlisting the coöperation of observatories in these several fields of work, both as to the method of observations and the mode of computation and publication. This alliance between solar physics and meteorology is most desirable, and there is little doubt that the foundations will be laid for a great practical science, whose outcome, we hope, will be an ability to forecast the seasonal conditions at least approximately from year to year. The benefits to be derived by the American public from a fair knowledge of the probable kind of seasons to be expected in the several portions of the country is so obvious that a generous support of the scientific work required to reach this result will seem not only permissible, but most important. How rapidly a practical conclusion for such studies can be reached will depend almost entirely upon the facilities placed at the disposal of the Weather Bureau by the government. It will require able students to handle the technical problems and many workers to carry out the details of the observations and make the necessary computations. The Secretary of Agriculture and the Chief of the Weather Bureau have been making preparations for this work by founding

a research meteorological observatory at Mount Weather, Bluemont, Virginia, about 65 miles northwest of Washington. The site contains 85 acres of land, located on the crest of the Blue Ridge Mountains, 1,800 feet above sea-level, and overlooking the Piedmont and the Shenandoah valleys. It is far enough away from any probable trolley line, such as one through the Snicker's Gap, to escape the electric currents which might injure the magnetic observations. The rocks are non-magnetic to a remarkable degree, and the magnetic field is uniform, so that the place is a good one for the observatory. We have a large building for administration and common meteorology already completed, a fine balloon and kite plant in process of construction, and operations have been begun on a first-class variation and absolute observatory for atmospheric magnetism. Plans are being studied for an excellent physical laboratory to accommodate experiments in meteorological physics, in the improvement of instruments, in atmospheric electricity, ionization and radioactivity of the air and of soils, and other research investigations. We are working out a comprehensive scheme for a solar physics observatory for studying the visible signs in the sunspots, prominences, faculæ, and photosphere by a photographic telescope, a horizontal spectro-heliograph, and a spectrum analyzer; also, it will contain a high-grade bolometer if the site proves sufficiently favorable for this line of radiation observations. There are numerous small pieces of auxiliary apparatus which will be developed and added as time and experience suggest.

To coördinate and organize so large a scientific plant will require time and money, but it is felt that we can in no other way suitably serve the American public in this branch of science. While there is similar work of the kind going on in different parts of the world, it is not possible for us to make use of it in practical forecasting. Except for some preliminary notices of results to be found in current scientific journals, the published reports are usually delayed two or three years behind the date of the observations. Furthermore, coming from so many sources, different countries, and different observers, the data are not homogeneous. It takes so much time and labor to work over and render comparable this miscellaneous material that it is better to bring all the necessary lines of study under one management and make the observations and computations homogeneous from the beginning, so as to keep the data in form for immediate deductions regarding the trend of the general meteorological conditions in the United States. We are looking to the future needs of a rapidly developing and intensely interesting branch of science, and are trying to build the very best observatory possible. We shall seek to equip it with the most satisfactory instruments which are available. There will be no haste in order to reach sensational forecasts, and it is believed that the public will indorse the strictly scientific method here outlined.

SOME FACTS ABOUT JAPAN

THE Johns Hopkins University has just published a very comprehensive essay by one of its students, Yukimasa Hattori, entitled "The Foreign Commerce of Japan Since the Restoration, 1869–1900." The author quotes in his opening chapter from that remarkable and historic oath of the Emperor, given April 6, 1898, on the happy restoration of imperial authority: "The uncivilized customs of former times shall be broken through. . . . Intellect and learning shall be sought for throughout the world to establish the foundation of the Empire." As Mr Hattori says, "Nothing will perhaps better illustrate the spirit of the times than this terse sentence, by which the long-established social and political institutions were condemned" and an era of commerce with nations inaugurated.

The essay consists of 79 printed pages, divided into three parts: (1) discusses the volume of trade, the text being supplemented by diagrams showing graphically the great increase. The author believes that the balance of trade for the period ending with 1900 was even; (2) describes the character of Japan's commerce; (3) explains the geographical distribution of the trade. England is losing her leading position. The share of Germany does not even yet amount to one-half that of England, but the German merchants are prosperous and energetic, and more and more of the English trade in Japan is passing into their hands.

The American imports have made the most remarkable increase. In 1895 the total value of Japan's imports from the United States was only 9,000,000 yen. In 1900 it had increased to the enormous sum of 62,000,000 yen. This rapid increase, however, is largely due to raw cotton, though the imports of manufactured goods also increased at a great pace.

WEALTH OF COAL

According to the estimate of Henry S. Munroe, the total coal-bearing area of Japan amounts to about 5,000 square miles, while the average thickness of veins is 15 feet. The coal product of Great Britain, it has been estimated, is equivalent to the labor of 133,000,000 operators working without wages for her enrichment. Japan, says Mr Munroe, has now, in the Ishikari field alone, stored up, and available for at least two centuries' use, the labor of an equal body of men. But it may be very much doubted whether this report of Mr Munroe is not somewhat exaggerated. Though a more recent careful geological survey has been made, it seems that the extent and amount of deposits can not be ascertained with precision. In 1899 the number of plants for mining coal was 2,108, covering an area of over 318,644,670 tsubo (1 tsubo = 0.03306 acre) and having a total estimated supply of 1,593,000,000 tons of coal. At the present rate of consumption, which amounts to some 9,000,000 tons (viz, 4,000,000 tons for export and 5,000,000 tons for home use), this supply will, roughly speaking, last about one hundred and seventy years.

COTTON SPINNERS

In view of the rapid growth of the cotton-spinning industry in Japan, from 70,000 spindles in 1885 to 1,088,000 spindles in 1900, it is interesting to consider at what economic advantage or disadvantage the Japanese spinner is competing with his rivals in Manchester and Bombay. It is said that the proportion between hands and spindles is three or four times as great in Japan as in the English factories, though the evidence is by no means conclusive on this point. The proportion of operators to spindles is practically the same in Japan as in India, being about one workman to

thirty spindles. In deftness and delicacy of touch Japanese operators have no rivals, but the Japanese industry is handicapped as yet by the scarcity of skilled labor. This disadvantage is, however, counterbalanced by the longer working hours of the Japanese mills, which work twenty-three hours out of twenty-four with two shifts of operators, and consequently their production per spindle is 40 per cent greater than the production at the Bombay mills and nearly double the production at English mills.

Another, and by far the most important, factor is the low rate of wages. In 1900 wages were 9 cents per diem (American gold) for men and 5 cents for women in Japan, while in the same year they ranged from $1.34 to $1.68 in England and from 13 to 35 cents in India. It will thus be seen that the wages of the Japanese spinners are far lower than those ruling in India. Though it is a false notion that low wages in themselves are sufficient to establish Japan's yarn trade, there is no gainsaying the fact that the rate of wages has much to do with the determination of the cost of production. The scarcity of capital and the consequent high rate of interest, which ranges ordinarily from 8 to 10 per cent, and sometimes even as high as 12 per cent, is a drawback. But this is offset by the longer working hours of the Japanese mills and the consequent larger production of yarn per spindle. Whether the mills are run at night or not, the cotton-spinning companies have to pay the same rate of interest.

RICE AND THE FOOD SUPPLY

It is undeniable that Japan has almost reached the maximum in her production of rice. Of late years, even under the most favorable circumstances, the Japanese crops have not sufficed to feed the growing population without the importation of foreign supplies. Every inch of the arable land of the country has been brought under cultivation by the labors of many centuries, and even the mountains are often cultivated to their highest summits, manure being laboriously carried up on human shoulders. Under these circumstances, there is at present no prospect for any large extension of cultivable soil, with the exception of Hokkaido, the northernmost island of Japan, a great part of which still remains untouched. However primitive be his method of cultivation, *the Japanese farmer understands his work so thoroughly that, by elaborate means of irrigation and the skillful use of fertilizers, he has been able to obtain rich harvests from the same land during fifteen or twenty centuries.* It will thus be inferred that agrarian improvements in the direction of more scientific processes of intensive cultivation would hardly afford much relief, especially in view of the fact that the population of Japan is increasing at the rate of 400,000 souls per annum. It is quite evident that at no remote time Japan will be compelled to rely for her means of subsistence upon foreign lands.

Agriculture, however, is still the fundamental basis of Japan's industrial life. To this industry the country owes its ability to pay its way, and but for the peasant farmer, who, by a more or less cheerful acquiescence in the imposition of a land tax, made it practicable for the newly formed central government to carry on the task of administration on a Western model, it is difficult to see where the resources could have been found for the consummation of so vast a change as that which has occurred within the last thirty years. The Japanese farmers toil hard throughout the year, but their profits are small compared with those derived from other kinds of business. Farmers consequently are constantly forsaking their holdings for other lines of business. The result is a net gain to the country as a whole. Work is applied in directions which give a greater return to the individual and to the country.

According to an investigation recently made, Chinese rice can be bought at half the price at present prevailing in Japan, and but for the existence of the Chinese "corn law," which prohibits any exportation of rice, Japanese agriculture would have suffered much more rapidly and seriously. The competition of China, where vast tracts of land are still left uncultivated and where the price of rice is cheap, must be expected sooner or later, and then a serious fall in the price of Japanese rice will set in, causing a series of agricultural changes.

Japan can not hope to compete in agricultural productions with those countries which have immense territory. Hence Japan must rely on industrial development rather than on agriculture, and must strive to excel in the quality of goods produced rather than in quantity. The examples of Egypt with its cotton, Italy with its rice, France with its silk, and England with its wool and sheep may well be cited as cases of countries the limited area of which does not allow them to compete with vast countries in the quantity of agricultural productions, but which in the quality of their respective staples distance all competitors. Japan possesses all the advantages necessary to make her a great manufacturing country. Her people possess exceptional skill and labor is relatively cheap; coal is abundant, and the raw material is easily obtainable either at home or in the neighboring countries.

SOME PECULIAR FEATURES OF CENTRAL AFRICAN GEOGRAPHY

FOR about ten degrees south of the equator in central Africa, in the southern part of the Kongo Valley, one is struck by the fact that the rivers, streams, and lakes are usually bordered with a dense vegetation, which extends out from the water a distance proportioned to the extent of the surface of the water. Adjacent hills and mountains are often found covered with dense vegetation on one side, and are bare on the other. Beyond this bordering vegetation are found vast plains, almost treeless or with small scrub growth and coarse, thin grass. Where the interior is not level the hills are also bare of large trees or heavy vegetable growth.

This condition may be explained by reference to several facts. For the months from May to October there is a dry season, when scarcely any rain falls at all. The days are hot, but the nights are cool, the thermometer often reading 50° F. There is a heavy evaporation from the waters during the day, followed by condensation into dense fog at night. This fog spreads out on the adjacent sides of the waters and moistens the surrounding territory, thus taking the place of rain and causing a luxuriant growth wherever it occurs. The usual morning winds blow the fog against the exposed sides of hills and mountains and up the valleys of tributary streamlets, acting on the soil so dampened like summer rains. Where the fog is not borne the country is dry. The natives often shave off the hair from one side of their heads, the effect presenting the same appearance as the hills of their country.

If one marches parallel with the rivers and within the range of these fogs and winds, he must pass through tremendous forests. If he gets out of this range he can march parallel with the same streams but over open plains or hills and mountains with only a sparse vegetation.

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THE GLACIERS OF ALASKA

THE rapidity with which the Alaskan glaciers are changing, some retreating and others apparently advancing, gives special value to the careful record of their present character contained in "Alaska; Glaciers and Glaciation,"* by Dr G. K. Gilbert. Dr Gilbert states that Nunatak Glacier between Professor Russell's visit in 1891 and his own visit in 1899 retreated fully a mile and possibly twice as much; Muir Glacier between 1880–1899 retreated 1½ miles, and since the earthquake of 1899 has retreated about three miles. On the other hand, other glaciers, like the Columbia and La Perouse, are now probably at their maximum, having been much smaller during the past 100 years.

While it is impossible to say absolutely why certain glaciers are diminishing while others a short distance away are increasing, Dr Gilbert suggests that the cause may be a change in the meteorologic conditions. The glaciers are different, some being fed by open névé fields and others by cirques. A rise in ocean temperature probably increases the wastage of the former class, but, on the contrary, enlarges the latter class by an increased fall of snow and rain, which more than counterbalances the wastage.

"Nearly all the glaciers of Alaska are comprised within a belt of moderate width which follows the southern coast from the Aleutian Islands to Portland canal. Curving about the great bight of the Pacific Ocean known as the Gulf of Alaska, this belt has a length of 1,600 miles, and its extreme width, near the middle, is about 250 miles. Within it the arrangement of glaciers is irregular, but their more important groups occupy the middle region, while near the ends they are comparatively sparse and small.

"The explanation of this massing of glaciers along the southern coast is not far to seek. The general circulation of the Pacific Ocean brings to the Gulf of Alaska a current of water which has been warmed in the tropics and still retains so much heat that its mean temperature is considerably above the normal for the latitude. The ocean is therefore, at some seasons, warmer than the contiguous land, and though air currents passing from ocean to land convey heat to the land they are themselves cooled. While traversing the ocean the air becomes loaded with moisture, the cooling over the land diminishes its water-carrying capacity, and part of its load falls to the ground as rain or snow. Moreover, all this coast is mountainous, so that landward flowing air is compelled to rise, and its capacity is still further reduced by rarefaction. At the greater altitudes the ratio of snow to rain is comparatively large, and the mountains thus become gathering grounds for the snows that feed glaciers. Farther inland the air currents descend somewhat, and the precipitation is diminished until the conditions for glacier formation cease. Hayes states that while the névé line of glaciers on the southward face of the St Elias Alps lies at about 2,000 feet above sea-level, its altitude on the northern face is over 6,000 feet.

"Along the western coast of Alaska the conditions are different. Bering Sea lies practically outside the influence of the Pacific circulation, and the temperature of its water is approximately normal. Its power to change air currents with moisture is small, especially in winter, and though the winter temperature over the adjacent land is low the snowfall is heavy. There are no great mountain ranges to concentrate

* "Alaska; Glaciers and Glaciation," by Grove Karl Gilbert. Vol. III of the Harriman Alaska Expedition Series. Edited by Dr C. Hart Merriam. With 18 maps and plates and 108 illustrations in text. Pp. 230. 5 by 10½ inches. New York: Doubleday, Page & Co. 1904.

the precipitation, and the snow of winter being broadly spread over plains or caught by ranges of a moderate height is dissipated by the melting and evaporation of summer.

"The glacier-bearing belt includes about three-tenths of the vast territory of Alaska. Its exploration has but begun; yet enough is known to give it rank as the third great glacier district of the world, only the Antarctic continent and Greenland surpassing it. Its ice may be roughly estimated to occupy a tenth of the surface, or an absolute area of between 15,000 and 20,000 square miles, and this expanse is so divided and scattered as to offer to the student the utmost variety of local condition and detail. Of alpine glaciers, such as would receive individual names if near the homes of men, there are many hundreds, possibly more than a thousand; of broad, composite fields, like the Muir and Malaspina, there are about half a dozen, and more than thirty are known to reach the coast and cast bergs into the sea."

In the summer of 1899 the Harriman Alaskan Expedition on board the *George W. Elder* sailed for hundreds of miles along the Alaskan coast, obtaining splendid panoramic views of the glacier systems. Opportunities for close examination included landings from the ship at thirty-four localities, at three of which the use of a camping outfit extended the time to several days. The remainder of the two months covered by the voyage was spent on the ship, and about half the sailing time was so conditioned by distance from shore, by light, and by weather as to permit profitable observation of the coast. After the voyage was over physiographic studies were continued by the aid of photographs. Thousands of views by members of the expedition were examined, as well as a large number from other sources, and several hundred of these have yielded information as to glaciers and glaciation.

The results of all these observations appear in the present volume. The magnificent series of panoramas, maps, and illustrations accompanying the text give the work unusual permanence and value. The volume, like the others in the Harriman Alaska series, is ably edited by Dr C. Hart Merriam.

GOVERNMENT ASSISTANCE IN HANDLING FOREST LANDS

THE forest lands of the United States are owned in three separate ways: First, by the Government of the United States, to which belong the reserved and unreserved forests of the public lands; second, by some of the states, and, third, by private owners, among whom are individual men, companies, and institutions.

The private forest lands exceed in area those of the states and the federal government combined, and their preservation in productive condition, as regards both timber and water supply, is of vast importance to the nation. As a rule, however, the treatment they receive tends to destroy their value rather than to sustain or increase it. The reason is evident and natural. These lands, like other private property, are held by the owners for the returns they yield, and the owners as yet have scarcely begun to understand that it pays better, as a rule, to protect a forest in harvesting the timber crop than to destroy it. A knowledge of how to bring about the desirable result is still more restricted, while trained men capable of advising forest owners in the matter are very few indeed.

GOVERNMENT COÖPERATION WITH FOREST OWNERS

Forest lands in private ownership are mainly of two kinds, small holdings, for the most part farmers' woodlots, and larger areas, chiefly valuable for lumber. The Bureau of Forestry is prepared, so far as its appropriations will permit, to lend its aid to the owners of each kind, on receipt of applications stating the situation, area, and character of the forests for which working plans are desired.

Applications will be considered in the order in which they are received, but precedence must be given to the lands most likely to furnish useful examples. A working plan once prepared will not be put in effect unless it is satisfactory to the owner.

The conditions upon which the Department of Agriculture, through the Bureau of Forestry, will undertake investigations and give assistance are stated in the agreement, and provide that a preliminary examination, if necessary, shall be made wholly at the charge of the department, and that if no further study is required final recommendations for management shall be made without cost to the owner. Advice, therefore, for those small tracts which do not require detailed study will be given without expense to the owner. As further stated in the agreement, the cost to the owner of working plans for tracts requiring detailed study will be based upon the actual cost of the necessary study on the ground, but may be reduced in consideration of the usefulness of the work as an example in practical forestry.

Tracts of any size, from five acres up, are eligible.

WOODLOTS

Throughout a very large portion of the United States nearly every farm has a certain part of its area under wood, either planted, as in regions otherwise treeless, or of natural growth. The value of this wooded portion, besides affording protection from the wind, is chiefly for fuel, fencing, and railroad ties, with some building material, and the wood needed for special uses about the farm. Without the woodlot a farm very often would be an unprofitable investment, because the farmer could not afford to buy the wood which now costs him very little except the labor of cutting and moving it. Indeed, in very many cases the woodlot keeps the farmer going. His labor there during the winter, when otherwise he would be idle, makes up for any deficit in the cultivated land, and the ready money he receives from the sale of fuel, ties, or other material is indispensable to his comfort and prosperity.

In two directions, then, material and money, the product of his woodlot is of high importance to the farmer. But in the majority of cases this part of the farm is far less useful than it might easily be made. This is true because the farmer does not study its productive capacity as he does that of his fields and pastures, and hence does not make it yield as freely as he might, with little or no additional labor, if he went about it in the right way.

TIMBERLANDS

Large bodies of forest land in almost every wooded portion of this country have come into the hands of private owners, and are held by them chiefly for their value as sources of timber. Much of this land, probably the greater part of it, is in hilly or mountainous regions, where the preservation of the forest is of importance for both wood and water, while the destruction of the lowland forests, except when they give way to agriculture, would bring with it the loss of a plentiful spring of national wealth.

The harvest of the timber crop on these private timberlands is commonly accompanied, under the usual methods of lumbering, by the destruction of the forest when merchantable trees predominate, and in any case by severe and needless injury. Fire follows the lum-

berman, in spite of the precaution he very often takes, until in many places it is thought to be inevitable. These are misfortunes from which the owners of the forest land are the first but not the only losers, for in the aggregate the loss is of immense public concern. It is to prevent these public and private losses that the Bureau offers its assistance, realizing fully that they must continue until the success of some of their number proves to the great mass of timberland owners that improved and conservative methods of lumbering will pay.

GEOGRAPHIC NOTES

PROBLEMS OF THE FAR EAST

ONE of the most valuable contributions to the understanding of the world questions of the Far East is a series of four monographs prepared by Hon. O. P. Austin and published by the Bureau of Statistics. The titles of the four are: Commercial Russia in 1904, Commercial Japan in 1904, Commercial China in 1904, Commercial Korea in 1904. Each report contains an outline map and includes the most authentic consular reports and other documents bearing on the Far East. As far as a limited edition will permit, the Bureau of Statistics gives the series to applicants.

OUR CLIMATE HELPS US

THE United States has an advantage over other countries in its climate. The sweep of the cold wave brings down some of the high potential in the upper air, which acts as a tonic but leaves no reaction. This theory is advanced and explained by Dr Willis L. Moore, Chief U. S. Weather Bureau, in a bulletin entitled "Climate."

"Climate is the most potent of any factor in the environment of races. It is climate and soil plus heredity and form of government that produce either vigorous or weak peoples. In this respect it is a question if the United States does not possess a constant potential that, all other conditions being equal, places it in a class by itself. . . .

"The sweep of the cold wave, as it is known in the United States, is quite distinctly North American. Nowhere else on fertile plains, unless it be in Russia, does the temperature show such wide oscillation within such short periods of time, nor do the icy blasts sweep over such a broad area. It is probable that much of the physical and the intellectual energies that have caused the United States to excel in agriculture, in manufacturing, and in commerce were produced by the invigorating effect of the cold, dry, highly electrified air of the North American cold wave. The anticyclonic systems of air that constitute cold waves have a marked downward component of motion. This motion brings from a considerable altitude to the surface of the earth some of the high electrical potential of the upper air, which is strongly stimulating to man and to other forms of animal life. These cold north winds have a much greater specific gravity than warm and humid winds, and this condition, added to the force with which they come, scatter and diffuse the befouled air near the surface of the earth."

THE LAND OF EARTHQUAKES

About 1,400 earthquake shocks are recorded yearly in Japan, the land of earthquakes, says Baron Dairoku Kikuchi in an exhaustive treatise, "Recent Seismological Investigations in Japan," just published for private circulation. The number is not as formidable as it would appear, however, as much less than 50 are sensible. Since 1875 15 earthquakes have occurred suffi-

ciently severe to cause loss of life or serious damage to property. In October, 1891, took place the Great Nuno-Owari earthquake, in which 7,000 people were killed, over 17,000 injured, and nearly 20,000 buildings destroyed. In 1875 the imperial government commenced the systematic observation of earthquakes. Of the 223 large shocks recorded since the earliest times 47 had their origin in the Pacific, 17 in the Japan sea, 2 in the Inland sea, 114 inland, and 43 are obscure.

Baron Kikuchi believes that "the distribution of the earthquake origins in Japan seems to have a close connection with the curvilinear form of the country. They are arranged approximately in two systems, which are respectively parallel and normal to the arc formed by the Japanese islands." Almost all recent earthquakes in Japan, extending over a large area, seem to be "tectonic"—*i. e.*, due to mountain-forming agencies—while in earthquakes accompanying volcanic eruptions the shaking is confined to a comparatively small area.

The Imperial Earthquake Commission, which was founded in 1892, has been watching with special care magnetic disturbances in connection with earthquakes, and has found that such disturbances usually attend or preceded earthquakes. Continuous magnetic observations are now being made in five different places distributed over Japan as evenly as circumstances will allow. As Baron Kikuchi remarks, "this investigation is one of the few means at present available for diagnosing the state of underground stress, and it is a promising one." Other investigations have been undertaken to determine the relation of earthquakes to latitude variation. Determinations of gravity are also being made at properly chosen spots with a view of obtaining more knowledge of the internal structure of the land.

The commission is investigating into the existence of periodic oscillations in bays, gulfs, straits, etc., which oscillations may be the cause of the "tsunami" (tidal waves). If these oscillations are proven and their occurrence understood, it may be possible to predict "tsunami," which have so frequently devastated the east coast of Japan. The commission is also investigating earthquake-proof structures, the best forms for chimneys, piers, columns, bridges, etc.

PROSPERITY IN ARGENTINA

ARGENTINA is now entering upon a period of general progress and legitimate development. The day of revolutions seems to have passed and permanent stability of government to have been established. The State Department has recently published a report by John Barrett, formerly U. S. minister to the Republic, which contains a number of interesting facts about the country.

Argentina has an area of 1,120,000 square miles, nearly one-third the area of the United States and Alaska. This area, except a very small portion, is located in the south temperate zone. It is, therefore, strictly suited to white labor. In this vast extent, however, there are as yet only 5,000,000 inhabitants, while it can easily support 75,000,000. Buenos Ayres, the capital, is one of the most prosperous and beautiful cities in the world, and has a population of nearly 1,000,000. Neither in this city nor in the interior is there any considerable Indian or negro element, such as is found in other South American countries. The population is 99 per cent of white extraction.

The signs of prosperity and progress on every side, not only in Buenos Ayres, but in the provinces, impress the student of economic conditions. Money is abundant, and the banks are overburdened with deposits. The population is growing, but immigration is slow, because of reports of unfavorable conditions of taxes and land purchase or

tenure in the interior, which it is hoped the government will soon remedy.

There are 245,000,000 acres of arable and 235,000,000 acres of pastoral land, and yet only 21,000,000 acres are under cultivation, although the soil is equal to that of Illinois and Nebraska and the general conformation of the land not unlike our central West. The number of land-owners—that is, of farms and ranches, not city and town lots—is only 225,000. Hundreds of individual men in every state or province own each from 75 to 300 square miles of land, which will be ultimately divided up into small holdings and will support a great farming population. In short, the major portion of Argentina is in the same undeveloped agricultural condition as Kansas, Nebraska, and the Dakotas were 50 years ago.

As commerce is often termed the "life blood" of a nation, it is significant that the foreign trade of Argentina (imports and exports) for the year 1903 should have amounted to the remarkable total of approximately $352,000,000, an average of $70 per head—a figure unequaled by any other country. The imports from the United States were approximately $16,700,000, and the exports to the United States $8,125,000. In imports the United States ranked after Great Britain and Germany; in exports after Great Britain, France, Germany, Belgium, Africa, and Brazil.

THE GREATNESS OF OUR COUNTRY

THE value of merchandise entering the world's international commerce is $11,000,000,000 per annum; yet our country, young as it is, furnishes today a larger value of domestic exports entering that commerce than does any other nation. A still greater field and a still greater evidence of our own business activity is found in the measure of our internal commerce, the domestic markets of the United States, which of themselves aggregate $22,000,000,000 per annum—a sum just twice that of the total international commerce of the whole world." This is a quotation from a recent address of Hon. O. P. Austin, who continues:

"Our area, including Alaska, is equal to that of all Europe. Our total domestic exports are practically one and one-half billions of dollars and surpass those of any other nation. Our total money in circulation is more than two and one-half billions of dollars and exceeds that of any other country. Our total wealth is one hundred billions of dollars and exceeds that of the United Kingdom and Germany combined. The gross value of our manufactures is thirteen billions of dollars per annum and equals those of the United Kingdom, Germany, and France combined. Our railroads are two-fifths of the entire railway systems of the world, and our production of cotton, and corn, and wheat, and pig-iron, and copper, and all the chief articles which form the bulk of the world's international commerce exceeds that of any other nation."

Work for the Panama Canal.—Preliminary work for the Panama Canal has made considerable progress during the past year. An engineering force is now constructing a reservoir in the valley of the upper Rio Grande, which will furnish a minimum supply of 2,000,000 gallons a day for the city of Panama; also a distributing reservoir for the city of Panama at Ancon. Surveys, plans, and estimates for a sewerage system for the city of Colon, and surveys and estimates for establishing official grades for the streets of Panama are also being made. About 300 engineers have been busily engaged in making surveys to shorten and improve the line of the canal and to determine sites for dams. The canal commission report as follows in regard to the digging of Culebra cut:

"When we took over the work the French were removing about 25,000 cubic yards a month. We removed in August about 37,000, in September a

smaller amount, because the weather was bad and there were some bad slides, which broke up some of the excavators. We cut the unit cost of excavating material in July to 60½ cents per cubic yard; in August to 50½ cents per cubic yard. During the time Major Black was in charge there the French cost was 79 cents per cubic yard. One month we cut the cost down to 45 cents, but that was due to there being no rock excavations."

A cablegram from Christiania states that the Duke of Orleans has asked permission of the Norwegian government to hire the *Fram*, in which Dr Nansen made his voyage to the Arctic regions, for the purpose of an Arctic expedition in 1905.

Emigration from Italy to the United States. — The Italian Commissioner-General of Emigration has urged the Chamber of Deputies to make special appropriations for those districts in Italy which are sending out the largest number of immigrants. His object is to establish additional schools in the "emigrant" districts in order to teach the illiterate adults to read and write, so that if an illiteracy clause is inserted in our immigration laws by Congress, the number of Italians going to the United States may not be cut down. At the present time the economic welfare of large sections of southern Italy depends, says the Commissioner of Emigration, on their being able to send their extra laborers abroad, particularly to the United States. If the United States should suddenly refuse to admit immigrants who do not read or write, at least half of the Italians aiming for the United States would be unable to enter and would be forced back on their overcrowded homes. It is estimated that in 1901 there were 3,439,014 Italians living abroad, of whom 654,000 were scattered over Europe; 168,000 were in Africa (Tunis, 83,000; Algeria, 39,000; Egypt, 38,000); 745,000 were in North America (729,000 in the United States and 11,000 in Canada), and 1,852,000 were in South America (618,000 in Argentina and 1,100,000 in Brazil).

That Russia is a complete world in herself; that she possesses in her own mines, forests, and fields enough to satisfy her every want; that she ought to manufacture out of these possessions everything that her people need, and that she could do so if her tariff was high enough is the dominant theme of a recent speech of Mr Witte. Consul Monaghan has sent over an abstract of this speech, which contains the following figures to show the present extent of some of her manufacturing industries:

Name of industry.	Number of factories.	Number of employees.	Value of output.
Metal	5,824	758,644	$362,753,125
Textile	4,449	642,520	487,342,440
Food stuff	16,512	255,357	333,779,740
Leather	4,238	64,418	68,009,870
Wood	2,357	86,273	52,982,685
Ceramic	3,413	143,291	42,533,850
Chemical	769	35,320	30,670,825
Paper	532	46,190	23,427,350

Maps of Manchuria.—The German government has recently issued a series of map sheets of Manchuria showing the scene of war. The sheets show in detail the rivers and streams, the mountains and mountain passes, and the roads and trails. The French government has also issued map sheets of the same region. The two series are striking evidence of the confusion of our knowledge of Manchuria and Korea. For instance, the spelling of places is so different that they are almost unrecognizable—*i. e.*, Chemulpo is spelled Tschemulpo on the German map and Tche-moul Po on the French map. Now that all nations are so intimately and jointly interested in world events, they ought to decide on uniform spelling of geographic names.

GEOGRAPHIC LITERATURE

Winter India. By Eliza Ruhamah Scidmore. Profusely illustrated. Pp. 400. 5½ by 8 inches. New York: Century Co. 1903.

The well-known and brilliant author of "Jinrikisha Days in Japan" and "China: The Long-lived Empire," has given a most fascinating description of certain parts of India in her latest work, "Winter India." Though hundreds of books have appeared on the mysterious Indian peoples and their weird customs, practically all the chapters of this latest volume describe scenes that are now told for the first time. One is not surprised that Miss Scidmore, who did not hesitate to penetrate to the Klondike in 1898, succeeded in leaving the beaten track of tourists. In chapter IX she tells of her visit to Buddha-Gaya, where is the Temple of Mahabodhi, the Place of Great Intelligence, and the Sacred Bo-tree. "Not Jerusalem nor even Mecca is held in greater reverence by the millions of Christians and Mohammedans than is Buddha-Gaya by many more millions of Buddhists, who, inhabiting every part of Asia save India, look upon the temple at Mahabodhi as their greatest shrine, to the Sacred Bo-tree beside it as their most holy relic and living symbol, the most venerated tree on earth—Bodhi-druma, the Tree of Knowledge, beneath which Guatama became the Buddha, the Awakened, the Enlightened." And yet the place is rarely visited by tourists.

In chapter XI, "The Greatest Sight in the World," the author describes the worship of the Ganges at Benares. From 25,000 to 50,000 people regularly and on special occasions 100,000 bathers and worshipers, Brahmans of every caste, perform their daily rites in the Ganges. "They sipped handfuls of holy water, rinsed their mouths, lifted the water and let it stream through their fingers or pour back down the arm, facing always to the east, and moving their lips in prayer. They filled their water-jars and poured it over their heads, and they drank it 'to purify themselves,' our mentor said, although one group of purity-seekers stood two feet from the mouth of a rapidly discharging sewer, every sort of city filth floating to their hands and water-jars—the bodies of men and animals and decaying flowers floating by. They drank the pestilent fluid, they carried it home for household use, and bottles were being filled to be sent and carried to the remotest part of India. Western education and sanitary science avail nothing against the Ganges superstition. The British have provided a pure-water supply for Benares, but the people prefer the sacred dilution of sewerage and cremation-ground refuse, thus inviting and encouraging every disease."

"A new India for the tourist will date from the great durbar at Delhi in 1903, and India, which has been a winter preserve for visiting English, will be virtually discovered and opened to a wider clientele, made as possible and fit for luxurious travel as Egypt. Equally this day of cheap travel and cheap living will vanish as completely as on the Nile.

"For one to announce that he will spend a winter in India is hardly more definite or precise than to say that he will winter in Europe. India is a very large country—several large countries—since it equals in area and population all of Europe outside of Russia; and one travels the 1,900 miles of its extent from south to north through as many political divisions as there are great divisions of Europe, and differing as greatly in climate, physical features, and inhabitants. The Spaniard does not differ more from the Laplander than the sooty Tamil from the blue-eyed Afridi, the weak Bengali from the fighting Rajput

or the fierce Sikh. Besides the thirteen provinces under British rule, there are 650 native states; but only 200 of them are of great importance, since native states range in size from Hyderabad, the size of Italy, to single villages in Kathiawar and tiny valleys in the Himalayan foothills, empires two miles square."

In the Uttermost East. By C. H. Hawes. With 40 illustrations. Pp. 478. 5½ x 9 inches. Imported by Charles Scribner's Sons, New York. 1904. $4.50.

All but three brief chapters of this work are devoted to a description of Sakhalin and of the author's experiences during several months passed on the island. Mr Hawes states that the Russian prisons are much improved since George Kennan's visit to Siberia, but that they are still lamentably and unnecessarily harsh. Of the 7,000 prisoners engaged in hard labor on the island, only 70 were political exiles, all the others being condemned criminals.

From a military point of view it commands the entrance to the Amur and could be easily taken; but, as there is no port on Sakhalin to give shelter to vessels, possession to the island would be of little use, excepting for massing troops, say, at Pogobi, for transport in boats in calm weather across the five miles of straits to the mainland.

The island of Sakhalin is 590 miles long and from 17 to 100 miles broad, with an area of 29,336 miles, or a trifle less than that of Scotland, while its population on January 1, 1898, was about 36,000, or scarcely one-eighth of the population of the city of Edinburgh. The native population, excluding all of Russian descent, number about 5,000, of whom 1,500 are Ainus. It is separated from the most northerly of the large islands of Japan, Yezo, by La Perouse Strait, which presents to the mariner a difficult and dangerous crossing, though only 28 miles in width.

It is a mountainous country, a long backbone or ridge running from north to south and keeping near to the west coast, and three spurs stretching to the east coast. The land is for the greater part covered with primeval forest. So dense is this that the natives depend for highway upon the rivers, which they traverse in summer in canoes dug out of tree trunks and in winter in dog or reindeer sledges over the frozen surfaces.

Although it is common knowledge that the farther east of Paris one goes the more extreme is the climate, a fact which Napoleon did not seem to have realized in 1812, yet we should scarcely expect such extremes of climate as a range of 149 degrees of Fahrenheit on an island in the same latitude. There appear to be two main causes. The first is the prevalence of northerly and northwesterly winds in winter and of southerly and southeasterly in summer. The second is the presence of a cold current from the Okhotsk Sea flowing down both sides of the island. The ice, led by the current and driven by the wind from this great reservoir of frost, fills up all the northern portion of the Straits of Tartary, and makes of it a continuation of the subarctic region of frost.

The winter's cold is, however, fine and dry, and though it has been said that Sakhalin does not know the calm days that prevail throughout the winter in eastern Siberia, yet during the latter half of January and the month of February beautiful bright windless days succeed one another on the island, and the dog sledges and reindeer are brought out, and the natives make their journeys for the barter of skins.

In its present undeveloped condition the island presents no great commercial attraction. Japan draws supplies of salted fish from Sakhalin as well as from the Amur, and only in the case of hostilities with Russia would these be endangered. Coal is certainly mined, though not in large quantities, and the

supply is generally thought to be limited. The fur trade is no longer of serious account, and there remains only the petroleum springs, whose true value has not yet transpired. Having regard to its present population of criminals and ex-convicts, the island can not be said to exercise any great allurement.

South American Republics. Part 2: Peru, Chile, Bolivia, Ecuador, Venezuela, Colombia, Panama. By Thos. C. Dawson. With maps and illustrations. Pp. 513. 5½ by 8 inches. New York: G. P. Putnam's Sons. 1904.

Since the first volume was published, describing Brazil and Argentine, and reviewed in this Magazine several months ago, Mr Dawson has been transferred from Rio Janeiro, where he had been the American Consul General for a number of years, to the post of United States Minister to Santo Domingo. This second volume, like the first, contains much more history than geography, very little descriptive of the peoples or of the actual resources of the countries being included. Speaking of the new era which has begun in Colombia since the inauguration of General Reyes, Mr Dawson says: "It will be under his able guidance that Colombia will start on the tedious road leading to internal peace and regeneration, to financial rehabilitation, and to the reconcilement of those fierce factions whose wars have drenched their country's soil with blood for so many decades." With the completion of the Panama Canal, a new era will begin for the entire west coast of South America.

The Kingdom of Siam. Edited by A. Cecil Carter. With 50 full-page illustrations. Pp. 272. 5 by 7½ inches. New York: G. P. Putnam's Sons. 1904.

All the chapters in this exceedingly interesting and handsomely illustrated little volume were written by high officials in different departments of the government service of Siam, and we may therefore accept them as authentic.

Siam equals in size the States of California and Oregon combined and has a population of about 5,000,000. The Siamese are addicted to chewing, but they chew tea, not tobacco. The tea is not used as a beverage, but made into balls of a suitable size to fit into the hollow of the cheek comfortably. The Siamese are of smaller stature than the Chinese or Indians, but taller than the Japanese and Malays. They have straight black hair, which is worn cut short by both sexes; beards are little developed and complexion a light brown, like the races of southern Europe. The people are polite, courteous to strangers, and have a high sense of self-respect. "Slavery has never existed in Siam, though bond-serfdom, ending with the restitution of the debt, was formerly common, and although abolished as a legal institution still exists in outlying provinces, though only as a *bona fide* agreement between master and man." The position of women is high in Siam. They enjoy, both in business matters and social life, a great independence. Nearly every male can read and write.

Rice "constitutes not merely the principal, but almost the sole food of every one, from the highest noble to the lowliest plebeian; horses, cattle, dogs, cats, and all other domestic animals live on it; it is used for making beer and spirits; it enters largely into all ceremonials, and the superstitious observances in connection with it provide the people with their most frequent occasions for holiday-making." It is rice which forms the cargoes of the thousands of boats ever passing up and down the River Menam. Skill in planting rice seedlings vastly enhances a girl's chances in the marriage market, while a youth who ties the bundles clumsily stands small chance of getting a bride in his own village. In 1885 Siam exported 217,000 tons of rice; in

1903 nearly 800,000 tons, yet the production is still very far short of what it might be.

A reader of "The Kingdom of Siam" is impressed with the fact that the Siamese have considerable enterprise, that their lands are fertile and promising, and that the people will welcome foreign investment and treat the foreigner well. These impressions will be further confirmed by a visit to the Siamese pavilion at the Louisiana Purchase Exposition. That distant country has made a capital and most attractive exhibit at St Louis under the direction of Prof. J. Howard Gore, the Commissioner-General for Siam.

BOOKS RECEIVED

Japan by the Japanese. Edited by W. T. Stead. Pp. 700. 6 x 9 inches. New York: Dodd, Mead & Co. 1904. $5.00.

Early Western Travels, 1748-1846. By Reuben Gold Thwaites. Pp. 365. 9½ x 6½ inches. Cleveland, Ohio: Arthur H. Clark Co. 1904.

Type Studies from United States Geography. By Chas. A. McMurry. With maps and illustrations. Pp. 290. 7½ x 5 inches. New York: MacMillan Co. 1904. $0.50.

Dodge's Advanced Geography. By Prof. Richard Elwood Dodge. With maps and illustrations. Pp. 353. 10 x 8 inches. Chicago: Rand, McNally & Co. 1904. $1.20.

Cyclones of the Far East. By José Algué. With charts. Pp. 266. 9½ x 12 inches. Manila: Philippine Weather Bureau. 1904.

Round-the-World. By J. P. Thomson. With maps, plates, and illustrations. Pp. 357. 10 x 6 inches. Brisbane: Outridge Printing Co., Ltd. 1904.

RECENT GOVERNMENT REPORTS

BUREAU OF FORESTRY

The Basket Willow, Wm. F. Hubbard.

Forest Planting in Western Kansas, Royal S. Kellogg.

Chestnut in Southern Maryland, Raphael Zon.

U. S. GEOLOGICAL SURVEY

The Tin Deposits of the York Region, Alaska, Arthur J. Collier.

A Gazetteer of West Virginia, Henry Gannett.

The Production of Natural Gas, 1903, F. H. Oliphant.

The production of Petroleum, 1903, F. H. Oliphant.

Experiments on Schistosity and Slaty Cleavage, George F. Becker.

The Natural Features and Economic Development of the Sandusky, Maumee, Muskingum, and Miami Drainage Areas in Ohio, Benjamin H. Flynn and Margaret S. Flynn.

The Passaic Flood of 1903, Marshall Ora Leighton.

The Passaic Flood of 1902, George Buell Hollister and Marshall Ora Leighton.

First Conference of Engineers of the Reclamation Service, with accompanying papers, F. H. Newell.

Hydrographical Manual of the U. S. Geological Survey, Edw. C. Murphy, John C. Hoyt, and George B. Hollister.

Water Resources of the Salinas Valley, California, Homer Hamlin.

Geology and Water Resources of Part of the James River, South Dakota, J. E. Todd and C. M. Hall.

Accuracy of Stream Measurements (second enlarged edition), Edward Charles Murphy.

Destructive Floods in the United States in 1903, E. C. Murphy.

Contributions to the Hydrology of Eastern United States, 1903, Myron L. Fuller.

The Underground Waters of Gila Valley, Arizona, Willis T. Lee.

A Geological Reconnaissance Across the Bitter Root Range and Clearwater Mountains in Montana and Idaho, Waldemar Lindgren.

Economic Resources of the Northern Black Hills, J. D. Irving, with contributions by S. F. Emmons and T. A. Jaggar, Jr.

The Copper Deposits of the Encampment District of Wyoming, Arthur C. Spencer.

Zinc and Lead Deposits of Northern Arkansas, George I. Adams, assisted by Purdue and Burchard, with a section on the Determination and Correlation of Formations, E. O. Ulrich.

GEOGRAPHIC CONGRESS ABSTRACTS

TOPOGRAPHIC METHODS USED FOR THE NEW DETAIL MAPS OF THE GRAND CANYON OF THE COLORADO

BY FRANCOIS E. MATTHES

Two atlas sheets comprising about 500 square miles have recently been completed on a scale of $\frac{1}{4\,5\,0\,0\,0}$ and with a contour interval of 50 feet. With the exception of the plateaus bordering the chasm, the entire area has been mapped by planetable intersections taken from stations on the two rims. The peculiar topography of the Grand Canyon lent itself admirably to the intersection method. Indeed, it proved altogether unique in this respect, a thousand "cuts" from one station being by no means uncommon. The profuseness and intricacy of the details and the vast number of intersections they made necessary for the sketching precluded the use of such methods as are ordinarily employed by topographers for describing and recording "cuts" for future reference. Nor could any method be used in which the memory is in part relied upon in identifying points previously cut in. At the Grand Canyon hundreds of points were not located by intersection until more than a year after they had been cut in the first time. Again, the difficulties of drafting the extremely dense contouring on the often almost mathematically chiseled outlines of the so-called Temples rendered it necessary to evolve some method by which this laborious and time-robbing work could be done in the office without the great expense of maintaining a field party. The method adopted at the Grand Canyon fulfilled all the requirements, essentially through one and the same device. It may be termed the *Preliminary Sketch* method; and, while not claimed to be altogether novel, it certainly has never before been applied on so extensive a scale and with so much systematic elaboration. The paper described this method in detail and was accompanied by a series of sketches showing the successive steps in the work.

GEOGRAPHY AND HISTORY IN THE UNITED STATES

BY ALBERT PERRY BRIGHAM

The object of this paper was to suggest the nature and limits of geographic influence upon American history, and to inquire after the best correlation of such closely related themes in American schools.

Certain results flow from geographic conditions, while others belong to personal initiative and to social traits, which in turn may follow upon untraced geographic influences. But geographic conditions are vital and do not merely form the "theatre" of history.

This appears locally, as in the development of cities, in forms of agriculture and in routes of travel. It appears in great regions, as in the domain of a nation, especially with swift geographic adjustments in a young country which, like our own, has had a migrating frontier. Illustrations—recent changes in New England, and in the shifting status of the northern Mississippi states in their relations to the East and to the South, as affected by routes of transportation and by social and industrial differences. The reclamation of the arid lands belongs also to this series of adjustments. Finally, there may come worldwide adjustments of our own and other nations, in which all men shall be so placed as to win the best things for groups and for the race.

These relations between man and his environment must be appreciated by teachers of both subjects under consideration, and each must know in good measure the subject-matter of the other. These ideals are not now realized; the teacher of geography is not commonly familiar with history, while the Committee of Seven of the American Historical Association makes but meager reference to geography as a fundamental subject.

The two themes may be taught by one teacher, a common German method, but this is not possible in the best American high schools and colleges. The paper then considered methods of more formal correlation and discussed the gains to be won in each field.

A COMPARATIVE VIEW OF THE ARCTIC AND ANTARCTIC

BY FREDERICK A. COOK, M. D.

In forming a comparative view of the two polar areas there are encountered few points of similarity. In the Arctic the climate is usually stimulating. The storms, though at times severe, are spasmodic and separated by intervening periods of agreeable weather, while the color effects are generally cheerful. The sea is quiet, and the land has a coastal fringe free of snow and ice, where life thrives vigorously. To this the Antarctic offers a disheartening contrast. Depression, despair, and melancholy are here pressed into every realm of nature. Almost ceaseless winds drive the air and water with maddening agitation. Continuous low temperatures depress ambition, and the usual play of colors is a veil of gloom. The ice-cap fits the land surface so snugly that there is almost no uncovered ground where life can subsist.

Aside from the unequal distribution of heat supposedly due to the eccentricity of the

earth's axis, the polar dissimilarity would seem to be explained by the relative positions of land and water. The Arctic contains a sea encircled by land; the Antarctic contains a land isolated by a circumpolar sea. The main polar difference can be ascribed to the varying facilities offered by this distribution of land and water for the absorption and elimination of heat for the circulation of atmospheric and oceanic currents and for the migration of life.

In the north the great attraction has been the glory of attaining the pole. In the south the aim has been the determination of the limits of the hypothetical continent. Both objects remain unattained, but the combined efforts have given us a priceless fund of useful knowledge. The fascination of the polar dash will increase rather than diminish, and with it will go a similar enthusiasm to reach the South Pole. A forced march to the Boreal center, though quickly made and under difficulties so great as to prevent detail investigation, would nevertheless give us a valuable record of the physical environment of the mysterious Arctic basin. Such a record could be supplemented by subsequent studies of circumscribed areas, which, when assembled with our present information, would give us a good picture of the Arctic as a whole. Our record of the Antarctic, good as it is of the border lands, is singularly incomplete and incomprehensive. We need several inland efforts to acquaint us with the great overland sea of ice. The chain to connect our present links of frigid knowledge should be carried transpolar into the Boreal Sea, across the Austral highlands, to or beyond the geographical poles. The explorer has next to plan a journey to both the North and the South Poles.

NATIONAL GEOGRAPHIC SOCIETY

THE completed program of popular and scientific meetings for 1904-1905 is printed below. The popular meetings have been planned with a view to give a series of authoritative addresses on the great questions of the Far East, now so prominent. The plan of the technical meetings, which are designed more particularly for those engaged in or specially interested in scientific work, is changed somewhat from the plan of last year, in that there will be two or more speakers at every meeting instead of one. The arrangements announced are definite and there will be no change in the program.

THE POPULAR COURSE

The addresses in this Course will be delivered in the National Rifles Armory, 920 G street, at 8 p. m. on Friday evenings. Mr Foster's address will be published in the December number and other addresses in later numbers of the NATIONAL GEOGRAPHIC MAGAZINE.

November 11.—"The Japanese Side of the War." By Mr William E. Curtis. Illustrated.

November 25.—"China." By Hon. John W. Foster, formerly Secretary of State, author of "American Diplomacy in the Orient," "A Century of American Diplomacy."

December 9.—"Japan." By Baron Kentaro Kaneko, of the House of Peers of Japan, LL. D., Harvard University, 1899.

January 6, 1905.—"Recent Observations on the Russo-Japanese War, in Japan and Manchuria." By Dr Louis Livingston Seaman. Illustrated.

January 20.—"Russia." By Hon. Charles Emory Smith, formerly Postmaster General and Minister to Russia.

February 3.—"The Philippines." The Secretary of War, Hon. Wm. H. Taft, formerly Civil Governor of the Philippine Islands, has accepted the invitation of the Society to deliver the address on this subject, provided that the demands of public service do not interfere.

February 17.—"Manchuria and Korea." By Mr Edwin V. Morgan, U. S. Consul to Dalny. Illustrated.

March 10.—"The Panama Canal." Illustrated. Capt. F. A. Staunton U. S. N.

March 24.—"The Commercial Prize of the Orient and its Relation to the Commerce of the United States." By Hon. O. P. Austin, Chief of the Bureau of Statistics. Illustrated.

March 31.—"From Lexington to Yorktown." By Mr W. W. Ellsworth, of the Century Company. Illustrated.

April 14.—"Fighting the Boll Weevil." By Dr L. O. Howard, Chief of the Bureau of Entomology. Illustrated.

April 21.—"Niagara Falls." By Dr G. K. Gilbert, Vice President National Geographic Society. Illustrated.

SCIENTIFIC MEETINGS

For the presentation of technical papers and discussion.

The meetings of this course will be held at the new home of the Society, Hubbard Memorial Hall, Sixteenth and M streets, on Friday evenings, of the following dates.

November 18.—General subject, "Glacial Erosion."

Papers by Mr Willard D. Johnson, and Dr G. K. Gilbert.

December 2.—General subject, "Alaska."

1. Geography of Alaska. By Dr Alfred H. Brooks, of the U. S. Geological Survey.

2. The Alaskan Telegraph System. By General A. W. Greely, U. S. A., Chief Signal Officer.

3. The Salmon Fisheries of Alaska. By Dr Barton W. Evermann, of the Bureau of Fisheries.

4. Introducing Reindeer into Alaska from Siberia. By Dr William Hamilton, of the Bureau of Education.

December 16.—General subject, "China."

"A Geologist in China." By Mr Bailey Willis, of the U. S. Geological Survey.

"A Naturalist in China." By Dr C. L. Marlatt, of the Department of Agriculture.

"Some Remarks About Tibet and Chinese Turkestan." By Mr O. T. Crosby.

December 30.—General subject, "The Rocky Mountains." By Mr Robert H. Chapman, Mr W. H. Osgood, and Mr E. C. Barnard.

Thursday, January 12, 1905.—General subject, "The Reclamation Service." Mr F. H. Newell, Chief Engineer, and other engineers of the Reclamation Service, will describe the different irrigation works now being constructed.

January 13.—Annual meeting. Reports of officers and elections.

January 27.—General subject, "The American Deserts."

1. Vegetation. By Mr F. V. Coville, Botanist of the Department of Agriculture.

2. Physiography. By Dr G. K. Gilbert.

3. Introducing the Date Palm. By Mr W. T. Zwingle.

February 10.—General subject, "Progress in Animal Husbandry." There will be papers by Mr George M. Rommel, Mr G. Fayette Thompson, and others of the Department of Agriculture, on the work and plans of the Department for producing distinctive American breeds of Horses, on the Angora Goat, the Fat Tailed Sheep, the Barbadoes Woolless Sheep, on the introduction of the Bos indicus, etc.

February 24.—General subject, "The Botanical Investigations of the Department of Agriculture." By Mr F. V. Coville, Botanist, and members of his staff

March 3.—General subject, "Progress in Plant Physiology." Papers by Dr George T. Moore and others on "Inoculating the Ground," "Protecting Municipal Water Supply Systems," etc.

March 17.—General subject, "Japan."

The Geography of Japan. By Mr Eki Hioki, First Secretary of the Japanese Legation.

The Fisheries of Japan. By Dr Hugh M. Smith.

Agriculture in Japan. By Mr David G. Fairchild.

April 7.—General subject, "Forestry."

Papers by Mr Gifford Pinchot, Mr Overton Price, and others, of the U. S. Bureau of Forestry, and a paper on Japanese Bamboos, by Mr David G. Fairchild.

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THE NATIONAL GEOGRAPHIC MAGAZINE

CHINA *

BY HON. JOHN W. FOSTER

AUTHOR OF "AMERICAN DIPLOMACY IN THE ORIENT," "A CENTURY OF AMERICAN DIPLOMACY," ETC.

A BRITISH Cabinet Minister, in discussing the condition of China in the House of Commons about the time of the Boxer troubles, used the following language:

"History is full of accounts of the weakness and decay of great empires, but I do not think that history shows a single case in which an empire numbering its inhabitants by hundreds of millions, which has never received any blow directed against a vital part, whose inhabitants have many of the qualities which go to make up a great nation, being thrifty, industrious, enterprising, courageous—I do not think that history shows a single case where an empire of that kind had been apparently unable to act against the feeblest form of attack."

A study of this anomaly of history is a task too vast for a single lecture, and in which I can only touch the surface of the subject. At the outset it presents several interesting and distinctive characteristics. China is the most ancient of all the nations of the past or the present. It is the most numerous people ever gathered under a single government. It is the most homogeneous and durable race of all time. If we combine literature, philosophy, science, invention, the arts and industries, it will probably stand in the lead of all the nations. That such a people and government have reached the condition of apparently utter helplessness described by the British statesman is the marvel of the day, and challenges the attention of the student of history and politics.

In any consideration of the Chinese people, the fact which seems most strongly to impress us is its great antiquity. Fable and tradition carry the origin of the race and the foundation of the government far beyond our credibility, but stable history begins at a period anterior to the pyramids of Egypt, the earliest existing monuments of social order. The reign of the Emperor Yaou, the model monarch, who brought to the nation of antiquity its golden age, dates back of the Christian era twenty-three centuries; and from that time there is an almost unbroken historical record of

* An address before the National Geographic Society, November 25, 1904.

succeeding dynasties to the present day. The period embraced in that record covers the existence of all the great reigns of Egypt from the fourth dynasty onward to their close. It includes the rise and fall of the Chaldean, Assyrian, Babylonian, Persian, and Alexandrian empires of western Asia. Compared with it, the record of Greece and Rome is modern history, and the annals of the nations of Western Europe are but the events of yesterday.

It is not to be understood, however, that this national history of more than forty centuries is an unbroken record of prosperity and governmental order. There has been the same experience which marked the lot of the people of Egypt, of western Asia, of Greece, Rome, and modern Europe—wars, civil and foreign; rebellions and conquests; change of rulers and dynasties; periods of disorder, anarchy, corruption, and decay; famine, pestilence, financial ruin and industrial distress; religious persecution and social unrest; prosperity and depression; the golden era of literature and the dark ages of learning. But while all the other nations of the earth have fallen and ceased to exist because of these varied assaults, the Chinese Empire entered upon the nineteenth century stronger, more expansive, and more populous than ever before in its history.

Next to its antiquity, that which most impresses us is its enormous population. No other government of ancient or modern times has embraced so many people, and these in contiguous territory and ruled by the same system of laws and polity. The nearest approach in this respect is the British Empire; but its territory is scattered over the face of the globe and its system of laws is as varied as its possessions.

But this great population has been a slow growth. Even in its recorded history it goes back to a period of contracted territory and a comparatively feeble people. But it has shown a marvelous power of assimilation. The Chinese race, as it brought under its sway the adjoining peoples, absorbed them by commingling their blood and engrafting on them their language and customs. Not even the foreign conqueror appears to have had the slightest influence on their racial characteristics and very little on the government. In modern times they have been twice completely subjugated—by the great warrior Genghis Khan in the thirteenth century and by the Manchus in the seventeenth century—but in each instance the population experienced no essential change; the language, government, religion, and customs continued as before; the conquerors were absorbed by the conquered.

While it is the most numerous population under one government, it is also the most homogeneous. Throughout its whole extent there is but one written or printed language; the religious practices, the social ethics, the literature, and the system of education are the same. In these respects it is in marked contrast with India—a country of mixed races, languages, and religions. As a consequence, while China has had a continuous existence as a nation and has enjoyed more fully than most nations the blessings of peace, the history of India has been one of almost continual turmoil, alternately rent asunder by the rivalry of domestic rulers and laid waste by invading armies, until it fell an easy prey to Great Britain, whose firm but beneficent rule has given it, for the first time in its history, the blessings of peace and good government.

This homogeneity of the Chinese has contributed largely to the permanency of the nation; but another characteristic must be noted in this connection—the durability of the race. It has been said that of all the peoples mentioned in ancient history, only the Jews and Chinese remain; but the Jews have long ago lost

their country, their nationality, and their language, while all of these remain to the Chinese. We search in vain today in Egypt for a specimen of the great race which built the pyramids, carved the monuments of Karnak, and created its wondrous civilization. The races which made Assyria, Phœnicia, and Greece so famous and powerful have long since disappeared. The Roman of the republic became transformed during the empire and was completely extinguished in the Vandal invasion. The Anglo-Saxon of today is far from the Briton as found by Cæsar, and even quite different from the islander in the time of William the Conqueror. While in all other parts of the globe these transformations in human society have taken place, the imperturbable Chinese has continued unchanged from generation to generation, from dynasty to dynasty, so far as we can judge from his history and literature.

When we turn to the intellectual and material accomplishments of this people we find an equal cause for marvel and admiration. Centuries before Homer and long before the golden age of Pericles there existed a learning and literature which attest a high stage of intellectual attainment. From the earliest antiquity the taste for learning was developed, and, in contrast with other lands, it has continued a distinguishing characteristic uninterruptedly through all its history to the present day.

In the realm of philosophy and ethics it challenges a comparison with the best models of ancient or modern times. The teachings of Lautsz, Confucius, and Mencius are worthy to rank with those of their Western contemporaries, Socrates and Plato. The code of Confucius is without a parallel in its influence on the human race. Produced five centuries before the birth of Christ, it was the condensed teaching and wisdom of the Chinese writers anterior to that era, and for more than 2,000 years it has controlled the conduct of one-third of the inhabitants of the earth. Competent critics state that in its moral aspects it compares favorably with the precepts of the Greek and Roman sages, and in the influence which it has exerted over so many millions of minds it is incomparably superior; and in this view it is invested with an interest which no book besides the Bible can claim.

The Chinese are often said to be an imitative people, but it is a remarkable fact that some of the most useful, if not the most useful, inventions of the human race have had their origin in China. The art of printing was first practiced there, and a thousand years before Gutenberg was born books in large numbers were being produced by that process, and long before paper was known in Europe it was used in bookmaking in China. The mariner's compass, the forerunner of steam and electricity, which made possible the discovery of the new world and the intercommunication of all lands, the foundation of modern commerce, was used in China many centuries before it became known to the West, and the properties of the magnetic needle were mentioned by Chinese writers 2,000 years anterior. Gunpowder, which revolutionized all military science and is such a potent factor in the world's affairs, was first compounded by that people. Porcelain and silk manufacture reached a high grade of perfection early in Chinese history, and these, with its language, literature, and philosophy, were imparted to Korea, Japan, and other neighboring countries.

The Great Wall, traversing high mountains and large rivers, built two hundred years before the Christian era, still stands as the most extensive monument of antiquity to attest the high engineering skill and kingly energy of that day.

Of similar herculean proportions, but of a later origin and for a more useful

purpose, is the Grand Canal, which at one period stretched from its capital, Pekin, to its commercial metropolis, Canton, reaching through the entire extent of its most populous territory. Today, because the modern improvements in hydraulics have not been availed of and steam navigation is a successful competitor, this great work has fallen much into disuse, but up to the date of its construction it was the greatest public commercial work ever undertaken, and its completion and maintenance for many centuries are a striking evidence of the skill and enterprise of this people.

It adds greatly to the merit of the race for these attainments in literature, philosophy, invention, the arts and industries, when it is remembered that for the greater part of its existence as a nation it has maintained a complete isolation from the outside world, shut up by the ocean, the mountains, the deserts, and their own exclusiveness, and that these achievements in human progress were evolved from within the nation itself.

We look upon China, and justly so, as perversely conservative and strangely wedded to the past; but such has not always been its history. Up to a thousand years ago (and it then looked back upon a written history of three thousand years) it could truly claim to be the most progressive nation of the world. It has passed through great changes and wrought some beneficent reforms. The monarchy, first elective, has become centralized and hereditary. The feudal system grew into an intrenched institution, and about 200 B. C. its abuses caused a terrible struggle which resulted in its complete overthrow. Two thousand years ago the educational competitive system for office-holding was inaugurated, and this brought into politics a democratic element which practically abolished the hereditary nobility. A marked change occurred in the religious views of the Chinese early in the Christian era by the introduction of Buddhism from India. These facts show that profound changes have been experienced in the nation, and that the race has accepted them without seriously affecting its virility or homogeneity.

Why is it, then, that we see such helplessness, such utter incapacity to meet the emergencies which compass this nation of unparalleled attainments in the past—this homogeneous, indestructible, and multitudinous people? Its causes are not far to seek. They may be briefly generalized as, first, blind conservatism, and, second, the low grade of public and social morality. The record, which I have so hurriedly summarized, of national achievement has made the ruling classes intensely proud of their country and their race. Theirs is the Middle Kingdom, and all the other nations of the earth have been regarded as mere outlying provinces or dependencies. Well into the nineteenth century all embassies from foreign nations which sought intercourse with its rulers were treated as belonging to suzerain states. Their government was to them the perfection of many centuries of experience. Their learning was the concentrated wisdom of the greatest sages and scholars of past ages. They needed no commercial intercourse with the outside world, for had they not grown to be the most numerous and most contented of all peoples by a policy of non-intercourse? While they believed in the arts of peace and depreciated the soldier, by their military system the empire had withstood the assaults of its enemies and was apparently impregnable.

This confidence in their military strength was greatly shaken by the British and French wars in the middle half of the present century, and some pretense of organizing an army and navy was undertaken. About the time that Japan entered so energetically upon a

radical reorganization of its system on the western model, some steps were reluctantly taken under foreign pressure by the Chinese to bring themselves into contact with other nations by the establishment of embassies and the opening of a limited number of ports to trade. But all this was grudgingly done, and no serious effort was made to bring the country out of its seclusion and give it the benefit of the western improvements in military, commercial, and educational affairs. When the war with Japan came in 1894, China was shown to be a great helpless giant, without bone or muscle; a vast mass of people having no competent rulers or leaders; and they fell an easy prey to the well-armed and well-drilled Japanese troops. They are not without patriotism or courage, but both were useless fighting with mediæval weapons and tactics against such foes.

To this conservatism and conceit is to be added a widespread and generally prevailing evil system in official life. In theory the offices are given as the result of a competitive examination, but in times past the necessities of the government have led the rulers to dispose of them for money, and there grew up a practice of bribery which pervaded all departments, affected the collection and disbursement of the revenues, and entered into public contracts and the administration of justice. I would not speak so disparagingly of a people for whom I entertain a high respect were it not that this condition is admitted by the country's rulers themselves, who of late have been seeking to reform the abuses. The Empress Dowager in a recent edict recognized the spirit of corruption which pervaded official life, appealed to the patriotism of her subjects for reform, and threatened severe punishment upon those who persisted in their evil ways.

This state of affairs emphasizes the low grade of public and social morality. I have referred in terms of commendation to the influence of the Confucian philosophy. It is, however, purely a code of ethics, and makes no claim to religious instruction. To it must be attributed, more than any other influence, the hurtful conservatism of the Chinese, for it was based upon the wisdom of the past ages and taught unreserved obedience to the living father and veneration for ancestors, out of which has grown a kind of ceremonial worship and reverence for the past, which with many of the literary class takes the place of religion. Buddhism has been the prevailing religion of the masses for near two thousand years, but with it is joined a worship of demons and spirits of the most degrading and superstitious character. Their agnostic philosophy, their Buddhism without a personal deity, their blind superstition, have left this great people apparently unresponsive to the appeals of patriotism, to the demand for the purification of administration, and for a progressive and liberal policy of government.

It is true, as the English statesman quoted asserts, that China has never received a blow against a vital part of its territory or system of government, but the Japanese war was a rude awakening from its conservative stupor. It led to commercial, industrial, and territorial aggressions which resulted in the Boxer uprising in 1900 and the movement to expel all foreigners from the Empire, which in its turn at last opened the eyes of the conservative rulers to the great needs of the country. A brief reference to these events will enable us the better to understand the present condition of China.

An intense hatred of foreigners has marked the intercourse of its people with the outside world. The casual observer usually attributes this hatred chiefly to their antipathy to the missionaries, who have permeated the inmost recesses of the Empire. But an examination of the events of the past

ten years will show that other causes have more powerfully contributed to this state of feeling.

It is not to be denied that the introduction of Christianity into China has caused disturbances. There, as elsewhere, and in all ages, its influence has been revolutionary. Its founder declared he "came not to send peace, but a sword." Paul, the first and greatest of all missionaries, when he declared the gospel was "the power of God," used the Greek word *dunamis*, which has been anglicized to designate the most powerful of all modern explosives, dynamite. The teaching of Christianity in China tended to the introduction of ideas hostile to the existing governmental order and struck at ancestral worship, the most dear-cherished of all Chinese customs. The missionaries also opposed such native practices as slavery, concubinage, support of heathen festivals, and foot-binding. But the testimony of the best observers is that the Chinese are not inclined to religious persecution, and that their antipathy to the missionaries is not so much on account of their religion as because they are foreigners, and their presence leads to the introduction of foreign methods. Nevertheless, the propagation of Christianity has been attended by serious opposition and bloody riots.

A careful examination of the history of China, however, will show that the missionaries were far from being the chief cause of the Boxer uprising and the disturbances of the year 1900. History makes it plain that the principal object of securing intercourse with the East by the Christian nations has been the introduction and extension of commerce. On this account China has time and again suffered wars and great humiliation at the hands of powerful European nations. The unwelcome traffic in opium, forced upon China by Great Britain in order to benefit British India, has spread its baleful effects throughout the whole land. The establishment of lines of steamships and the construction of railroads have thrown hundreds of thousands of Chinese laborers out of employment. The growing importation of American and British cotton fabrics have made idle looms and untilled cotton fields; American kerosene is destroying the husbandry of vegetable oils; and in an infinity of other ways is Western commerce affecting the domestic industries, and this with a people who are intensely conservative, wedded to ancient customs, and inveterate enemies of foreign trade.

The construction of railroads was bitterly opposed by the masses of the people, not only for the reasons just stated, but because it disturbed their venerated ancestral worship. Chinese burial places are not segregated, but are found all over the face of the country. Their desecration is regarded as the most heinous of crimes. It is stated that the Germans, in constructing a line from their port of Kiao-chau, a distance of forty-six miles, though using all the care possible to pass around the most thickly located burial places, had to remove no less than three thousand graves. It is not strange to learn that all lines of railway in their inception had to be guarded by soldiers.

After the Japanese war a new impetus was given to commercial enterprise. Foreign traders, as well as missionaries, visited the interior, and the Chinese saw their country being overrun by the hated people. A scramble for railroad and mining concessions followed, supported by the influence of the representatives of the foreign governments; grants were made to Russians, French, British, Americans, Belgians, and others, and the whole territory of the Empire seemed destined to be plowed over by the feared and hated locomotive, and the most profitable enterprises to be placed in the hands of the despised foreigners. These commercial influences contributed much

Map showing Foreign Concessions in North China

Map showing Foreign Concessions in South China

more than the missionaries to the late uprising in China.

The most potent cause of the Boxer movement was neither the missions nor commerce, but the political influences which were operating for the dismemberment and destruction of the Empire. These influences were especially manifest during 1897 and 1898. The cession of Formosa to Japan in 1895 was not so offensive, as it was the result of a great war, and some compensation to the victor in territory seemed natural; but the effect of the next aggression was quite different. Following the murder of two German Catholic priests by a mob in Shantung in November, 1897, the German government sent a strong naval force to the spacious harbor of Kiao-chau, ejected the Chinese forces from the fortifications, and occupied the place with marines. This was soon followed by the demand of the German minister in Pekin for an apology for the murder of the priests, a large indemnity, and a lease of the harbor and an adjoining extensive section of territory, with the privilege of building railroads and exploiting mines in the province of Shantung. The remonstrances of the Tsung-li Yamen (the foreign office) against this summary method of procedure and the exorbitant demands were of no avail.

The German seizure of Kiao-chau was followed a month later by the occupation of Port Arthur by a Russian fleet, and in March, 1898, Russia secured a lease of that strong fortress and harbor, as well as the neighboring port of Talienwan and the control of the peninsula of Liaotung and the adjoining islands, with the privilege of connecting the leased territory by railroad, through Manchuria, with the Siberian trunk line and the right to protect the line with Russian soldiers. Only three years before Russia, in conjunction with its ally, France, and with Germany, had compelled Japan to give up the Liaotung peninsula on the ground that a nation holding it might at any time threaten Pekin. That action of Russia led Great Britain to demand and secure the lease of the fortress of Wei-hai-wei and a strip of adjoining territory on the opposite promontory, and also a large portion of the mainland opposite Hongkong. France, which had some years before taken the large suzerain territory of Annam and Tonquin, also secured in 1898 an enlargement of its possessions in that region at the expense of China in the lease of important harbors and the peninsula opposite the island of Hainan.

These proceedings were followed by agreements or treaties between Russia and Great Britain and between Germany and Great Britain as to what are termed "spheres of influence" in China without consulting the government of that country or taking its wishes or interests into account. At the demand of the same powers several new ports were opened to foreign trade, with the usual concomitants of foreign territorial concessions and extraterritorial jurisdiction, until now the extensive Chinese Empire is reduced to the anomalous condition of scarcely possessing a single harbor in all its long line of seacoast where it can concentrate its navy and establish a base of warlike operations without the consent of the treaty powers. Not the least of the irritants which induced the Boxer movement was the foreign authority which was exercised in the treaty ports and the abuse and contempt with which the natives were there treated.

The rulers of China understood full well the causes which had nerved their people to rise in their wrath and undertake the impossible task of the expulsion of the foreigners. In 1900, after the Boxer movement had been put down, Li Hung Chang, in giving the cause of the outbreak, stated that its chief impetus was found in the high-handed course of Germany, and it "was due to

the deep-seated hatred of the Chinese people toward foreigners. China had been oppressed, trampled upon, coerced, cajoled, her territory taken, and her usages flouted." The Empress Dowager, in her famous proclamation, issued when the Boxers were reaching their ascendancy and just before the violent outburst of 1900, exclaimed: "The various powers cast upon us looks of tiger-like voracity, hustling each other in their endeavors to be the first to seize upon our inmost territory. They think that China, having neither money nor troops, would never venture to go to war with them. They fail to understand, however, that there are some things which this Empire can never consent to, and that, if hard pressed, we have no alternative but to rely upon the justice of our cause, the knowledge of which in our breast strengthens our resolve and steels us to present a united front against our aggressors."

It is unnecessary for me to rehearse the events which attended the Boxer uprising of 1900. The siege of the legations, the repulse of the relief force, the march of the allied army to Pekin, the flight of the court, the deliverance of the diplomatic corps and the foreign residents of the capital are fresh in your minds. What followed is of special interest in connection with the declaration of the British statesman.

The events succeeding the Japanese war of 1894 and the intervention of the foreign powers to put down the Boxer movement seemed to presage the dismemberment of the great empire. But through the opportune action of the government of the United States a situation arose which gave promise of the preservation of the Chinese government and nation. While the allied powers were gathering their forces for the march upon Pekin, in which the United States readily participated, Mr Hay, the American Secretary of State, under date of July 3, 1900, sent a circular note to the powers, in which the purpose of the United States in uniting in the military movement was set forth, and it was declared that the ultimate object should be to bring about permanent safety and peace in China, preserve its territorial and administrative entity, and safeguard for the world the principle of equal and impartial trade with all parts of the Chinese Empire.

Although this policy was not in harmony with the recent conduct of some of the European powers, it was so fully consonant with the principles of international justice that it met with the approval of the intelligent public sentiment of the world. Through the long and tedious negotiations which followed the occupation of Pekin by the allied army this policy was consistently adhered to by the United States, and has stood in the way of all further encroachment on Chinese territory.

In the settlement of the claims of foreign nations and subjects growing out of the Boxer troubles China was made to drink the cup of humiliation to its very dregs. The protocol which was signed between the Chinese plenipotentiaries and the eleven foreign representatives who participated in the negotiations shows how utterly helpless the Chinese government recognized its situation to be, and it may be well to recall the terms of that instrument. The edict of the Emperor, which was required to be issued before the protocol was signed, indicates both the attempted exculpation and the abasement of the throne, and is quoted in part as a specimen of Chinese official language, as follows:

"When we consider the commencement of these (Boxer) events, we find that they are attributable to several stupid princes and ministers, insane, absolutely ignorant, turbulent, and who have ignored the laws. They had almost absolute confidence in pernicious methods and have led on the court.

Not only did they refuse to obey our orders to exterminate the Boxers, but they have gone so far as to believe in them, and stupidly they began to attack the legations. So it was that this evil fire spread abroad, and circumstances did not permit of its being stopped, several thousands of evil-doers having assembled at the elbow and the armpit (that is to say, at the most important points). Furthermore, the leaders forced generals and ignorant soldiers to attack the legations, and so it befell that inconceivable evils existed for several months.

"The tutelar deities of the Empire have been in danger, the imperial tombs and the temples of ancestors have trembled, the country has been devastated, the inhabitants are plunged in misery. No words can express the dangers to which we and Her Majesty the Empress Dowager have been exposed. Our heart and our head are still in pain; our tears and our resentment are confounded. It is to you, princes and ministers, who, by believing in evil words and allowing evil-doers free hand, have put in danger in heaven our ancestors and our gods, and who here below have caused the people to endure these calamities."

The protocol contained the following provisions: Prince Chun, of the imperial family, was to make a journey to Berlin to convey to the Emperor of Germany the expression of the regrets of the Emperor of China and the Chinese government for the assassination of Baron von Ketteler, the German minister. The Chinese government further agreed to erect a memorial monument, in the shape of an arch, covering the entire width of the street, on the spot where the assassination occurred, with inscriptions in the Latin, German, and Chinese languages, expressing the regrets of the Emperor of China for the murder; and to make reparation for the assassination of the chancellor of the Japanese legation, the Emperor, by imperial edict, sent an official of high rank as his plenipotentiary to Tokio to express to the Emperor of Japan his regret at that assassination.

Punishments of various kinds were to be inflicted on the officials guilty of complicity in the Boxer movement. Some of the imperial princes, cabinet ministers, and generals were ordered to commit suicide, others to be beheaded, a number deprived of their honors and degraded, and some of the leaders closely connected with the imperial family sent into perpetual banishment and imprisonment. The edict ordering these punishments has some expressions peculiarly Oriental. Of Prince Tuan it is said "he led away with him several princes. He foolishly gave heed to the Boxers and stupidly advised fighting. So all these troubles broke out." Duke Fu Kuo "foolishly published proclamations contrary to the treaties. He should also be punished for his faults. We deprive them of their titles of nobility, but considering that they belong to our family, we order, as a special act of grace, that they be sent to Ili, where they shall be condemned to prison for life."

Tu Hsien "foolishly believed in the charms of the Boxers. Arriving at Pekin, he extolled them so highly that several princes and ministers fell under his evil influence. Being governor of Shansi, he massacred a great number of missionaries and Christians. He is worse than an imbecile, than a fool, than a murderer; he is the chief culprit and author of all these calamities. . . . We order that he shall be at once beheaded."

Prince Chuang, "already degraded, allowed the Boxers to attack the legations. He, on his own authority, published proclamations contrary to the treaties; he lightly believed the statements of evil-doers; he unlawfully caused to be decapitated a great number of persons; he has shown himself, of a

truth, vulgar and stupid. We invite him, as a favor, to commit suicide. We direct Ko-pao-hua, President of the Board of Censors, to go and see that he does it."

After directing the various other punishments to be carried out, the edict concludes: "After the promulgation of this decree all our friendly nations should recognize that the events caused by the Boxers are in truth only attributive to the principal authors of trouble, and in no wise to the wishes of the court."

The protocol of the foreign powers further required that the official examinations (which are the stepping-stones for admission to official life) be suspended for five years in all cities where foreigners were massacred or cruelly treated; that expiatory monuments be erected in all foreign cemeteries which had been desecrated (the expenditure for which in Pekin alone amounted to over $50,000); that the importation into China of arms and ammunition be prohibited for two years, and the publication and posting in all the provinces of an imperial edict announcing the punishments stated, and also that membership in any anti-foreign society would be punished with death, and that viceroys, governors, and provincial or local officials would be held responsible for anti-foreign troubles in their respective districts, and if the authors were not immediately punished, these officials would be promptly dismissed and forever deprived of official functions and honors.

An indemnity of 450,000,000 taels (approximately $337,000,000) was stipulated to be paid in installments to thirteen foreign governments to cover losses of individuals and the expenses of the armed expedition to Pekin. The share of the United States was over $24,000,000.

But even these drastic measures were not regarded as a sufficient punishment and humiliation. The Chinese government was required to set apart a large section of the city of Pekin for the foreign legations, the same to be fortified and garrisoned by an unlimited number of foreign troops; the strong fortresses at the mouth of the Pei-ho River and all the fortifications from that point to Pekin to be razed to the ground, and these and other points on the route to the imperial capital to be occupied by foreign troops.

It is creditable to the plighted faith of the Chinese government to be able to state that these harsh and abasing measures have been and are being carried out with exactness.

I have gone somewhat into detail in giving the terms of settlements made between the imperial government and the foreign powers in order to show what exemplary and onerous measures were deemed necessary as an atonement for the acts caused by the anti-foreign uprising of 1900 and to prevent a recurrence in the future. The severe lesson is bringing forth beneficent results. The two British wars of 1840 and 1860, with the British and French occupation of Pekin and the French hostilities of 1885, had done little to open the eyes of the Chinese ruling classes to the futility of the anti-foreign spirit; and even the Japanese war of 1894–'5 in no marked degree had overcome that sentiment. The exactions of the foreign powers, as shown in the protocol of 1901, at last opened the eyes of the conservative officials to the necessity of a new order of affairs.

A great change has taken place and is still going on in that Empire. It has begun at the fountain-head of power and influence in the person of the Empress Dowager. She has been the real ruler of China for more than a quarter of a century. She is a remarkable woman, of great intellectual power, of strong will, and of marked influence upon the statesmen who surround the throne and direct the administration of

government. She has apparently read well the lesson taught in the protocol of the foreign powers. Her views and her conduct have undergone a great change. From a strong conservative and vindictive in temperament, she has become a liberal ruler and displays a kindly spirit to those who come in contact with her.

The court, like its mistress, has undergone a great transformation. For two hundred and fifty years, since Russia first established diplomatic intercourse with it, the Western powers have been engaged in a constant struggle to secure recognition on a basis of equality. Up to a very recent date no one could appear in the presence of the occupant of the Dragon Throne without prostration and personal abasement. Today the Emperor may be seen as readily and with as little formality as in audience of the crowned heads of Europe, and the Empress Dowager delights to entertain her foreign visitors with an afternoon tea. The newspaper correspondents and society gossips give Mrs Conger, the accomplished wife of the American minister, much credit for the friendly change in Her Majesty's attitude toward foreigners. It is pleasant to remark, in passing, that Mr Conger has won golden opinions from native and foreign circles for his great discretion and good judgment in his long term of diplomatic service, for his fortitude in the siege of the legations, his uniform courtesy, and his devotion to the interests of his country.

The change in the conduct of the Empress Dowager has led to the sending abroad of imperial princes, has impressed itself upon her cabinet ministers and their subordinates, and its effect has extended to the remotest provinces. She has taken care to send to some of the most conservative and anti-foreign provinces viceroys of known liberal views, who are rapidly transforming the sentiments of the inhabitants. The edicts which have recently appeared rival the liberal ones of the Emperor six years ago and for which he was virtually deposed, making changes in the subjects and methods of the government examinations for officials, relegating to a less prominent place the Chinese classics, etc., bringing to the front "the Western learning," modern science, history, and politics, directing the establishment of colleges and schools, and denouncing official corruption.

A spirit of intelligence is being awakened. Under the direction of Sir Robert Hart, a domestic postal system has been established (hitherto unknown) reaching to the remotest parts of the Empire. A great desire for education has been created. Viceroys and governors are establishing colleges and schools on the Western model, and the demand for foreign teachers has been greater than the supply. Many more students than formerly are being sent abroad. More than one thousand are now in the Japanese universities and colleges; many hundreds have been sent to Europe, and quite a number are now in American institutions of learning.

Many more would be in this country were it not for the harsh measures of the immigration officials at San Francisco applied to incoming Chinese students. Mr William E. Curtis, the well-known newspaper correspondent and author of Oriental books, who has recently returned from a visit to China, is my authority for this statement. There are now in the United States the sons of two of the most influential viceroys and of other high officials. Mr Curtis says "they could not have entered this country without suffering shameful indignities and humiliations, if they had not accompanied the Chinese minister at Washington as a part of his suite." He adds: "No Chinese gentleman, whatever his rank or wealth or purpose, can enter the port of San Francisco without

suffering insult from the immigration officials there."

I am pleased to say that under the new administration of Chinese immigration by the Department of Commerce and Labor some amelioration of the harsh rules has been experienced, and it is anticipated that the new treaty being negotiated between the two governments will sweep away the regulations which have brought shame to our country. We have published to the world that our people can not compete with the Chinese in industrial pursuits, and the imperial government itself recognizes that the exclusion of Chinese labor is the settled policy of this country; but it is highly desirable that the United States, which has been foremost among the nations in conceding the equality of that Empire in its international relations and in encouraging it to enter upon a liberal policy, should welcome to our shores its merchants and students.

Another evidence of the spirit of enlightenment now prevailing in China is the establishment and multiplication of newspapers. That Empire boasts of the oldest newspaper in the world, the Pekin *Gazette*, the official organ of the government, dating back 3,000 years; but it is merely the publication of the official edicts and orders. Until recent years no other newspaper was published in the vernacular. Since the new régime at Pekin newspapers and periodicals in China have greatly increased, until now scarcely any important town is without one or more of them.

Other evidence of the new spirit are found in the proclamations of some of the viceroys against the female practice of foot-binding and against the national vice of gambling and other demoralizing practices. Anti-foreign, and especially anti-missionary, riots have almost entirely ceased; when they occur they are due to local and exceptional causes, and the offenders are promptly punished.

The material improvement in the country is especially noted in the rapid development of railroad construction. At the conclusion of the Japanese war there were less than 200 miles of railroad in operation. Now there are about 2,000 miles completed and 1,200 in process of construction. Of the completed portion, 1,050 miles have been built by the Russians in Manchuria and on the Liaotung peninsula. It may reasonably be expected that within a few years trunk lines and branches will traverse the thickly settled portions of the provinces, which should have the effect to consolidate the power of the central government, tend to exterminate the anti-foreign spirit, and greatly develop the resources of the Empire.

It is not the province of the lecturer before a geographic society to enter the field of prophecy, and it is even unsafe for a student of international politics; but I may venture some suppositions at least respecting the future of China. We can not anticipate the same rapid development in Western methods which has attended the history of Japan during the last half century. If for no other cause, the different temperament of the race will prevent it. But it is quite certain that China has entered upon the task of internal reform and transformation, and that the movement, though it may be retarded, will not go backward. Its future depends much upon the final result of the present Russo-Japanese war. If it shall terminate with the permanent withdrawal of Russia from Liaotung and Manchuria, Japanese influence will be in the ascendancy in China, and the reform movement will go forward more rapidly. Already they are exercising a greater influence on the people than any other nationality. It is said that 70 per cent of the foreign teachers are Japanese, and they are largely represented in the Chinese army. Their commerce with the country is growing

more rapidly than that of any other nation.

Should they become the predominating influence in political and governmental circles as well, students in the questions of the Far East have seen a threatening danger for the nations of Christendom. The "Yellow peril," in their view, looms large above the horizon of the Pacific. It may have some interest in this connection to state that this subject was more than once discussed during the peace negotiations between China and Japan by their two greatest statesmen, Li Hung Chang and Marquis Ito. I make the following extract from the report of the verbal conferences:

"VICEROY LI: On the Asiatic continent China and Japan are close neighbors, and the written language is the same. Is it well that we should live at enmity? . . . We should follow the example of Europe—increase our armaments, and confederate. If Your Excellency and myself thoroughly appreciate this, we can not but conclude that the policy which should rule the Asiatic continent is that we should establish an enduring peace in order to prevent the *yellow race* from succumbing to the *white race* of Europe.

"MARQUIS ITO: I indorse Your Excellency's views with all my heart. While I was in Tientsin ten years ago, I discussed with Your Excellency upon the reforms in China, but I regret to see that nothing whatever has been done.

"LI: I remember. . . . Yet, shame to say, ten years have wrought no changes—a proof of our incapacity; while Japan has organized an efficient army after Western models, and is constantly perfecting her government.

"ITO: Heaven is impartial and speeds the right. If China will but make an effort help will come from on high. Let there be the will, and Heaven, who cares alike for us all, will not forsake you; thus a nation may control its own destiny. . . .

"LI: Suppose China was to invite you to be her prime minister?

"ITO: I would accept with my Emperor's permission."

Sir Robert Hart, who for half a century has made a study of Chinese character and capacity, writing just after passing through the siege of the legations in 1900, expressed the belief that the Chinese hatred of foreigners was a real menace to the world. He suggested two remedies for this impending danger: the first was partition of the vast Empire among the great powers, which he regarded as full of difficulties; the second, a miraculous spread of Christianity, "a not impossible, but scarcely to be hoped for, religious triumph . . . which would convert China into the friendliest of friendly powers." Certainly such a possibility in the estimate of so high an authority should stimulate the friends of Christian missions to redouble their efforts among that great people.

I have never regarded the "Yellow peril" with serious concern. Japan is too greatly leavened with the spirit of modern ideas to make race hatred a controlling motive of its foreign policy. If the present movement in China continues, the anti-foreign feeling there must be greatly modified. The wonderful development of Japan's military power certainly adds a new factor to the international problems of the world, but its policy will be along economic rather than racial lines.

Happily the ruling power today in the Far East is Great Britain. Her government has most heartily supported the efforts of Secretary Hay to maintain the autonomy of China and an "open door" there. "A nation of shopkeepers" was the term derisively applied by Napoleon to the British, and it has adhered to them for a century; but in that period they have gone on extending their trade, sometimes by force of arms, and, as opportunity offered, by diplomacy or enterprise, until today they control a domain grander than ever before held under the

sway of one government. While the motive which brought about this dominion was mainly mercenary, it has resulted in great good to the human race. He who journeys around the globe is impressed with the mighty power of British rule, but he also sees that its rule is beneficent; and such is the general, though not the invariable, influence of commerce. It opens nations to intercourse, it tends to peace, it enlarges the comforts and aspirations of the people.

It is fortunate that the interests and the policy of the United States and Great Britain in the Far East so fully harmonize. Japan has manifested with equal heartiness its conformity to the same policy. There is no reason why the other commercial nations should not pursue the same line of conduct. Hence, if internal peace is preserved, the ancient Chinese Empire may look forward to an era of unprecedented development and prosperity, and add many more cycles to its unparalleled history.

A DOUBTFUL ISLAND OF THE PACIFIC*

By James D. Hague

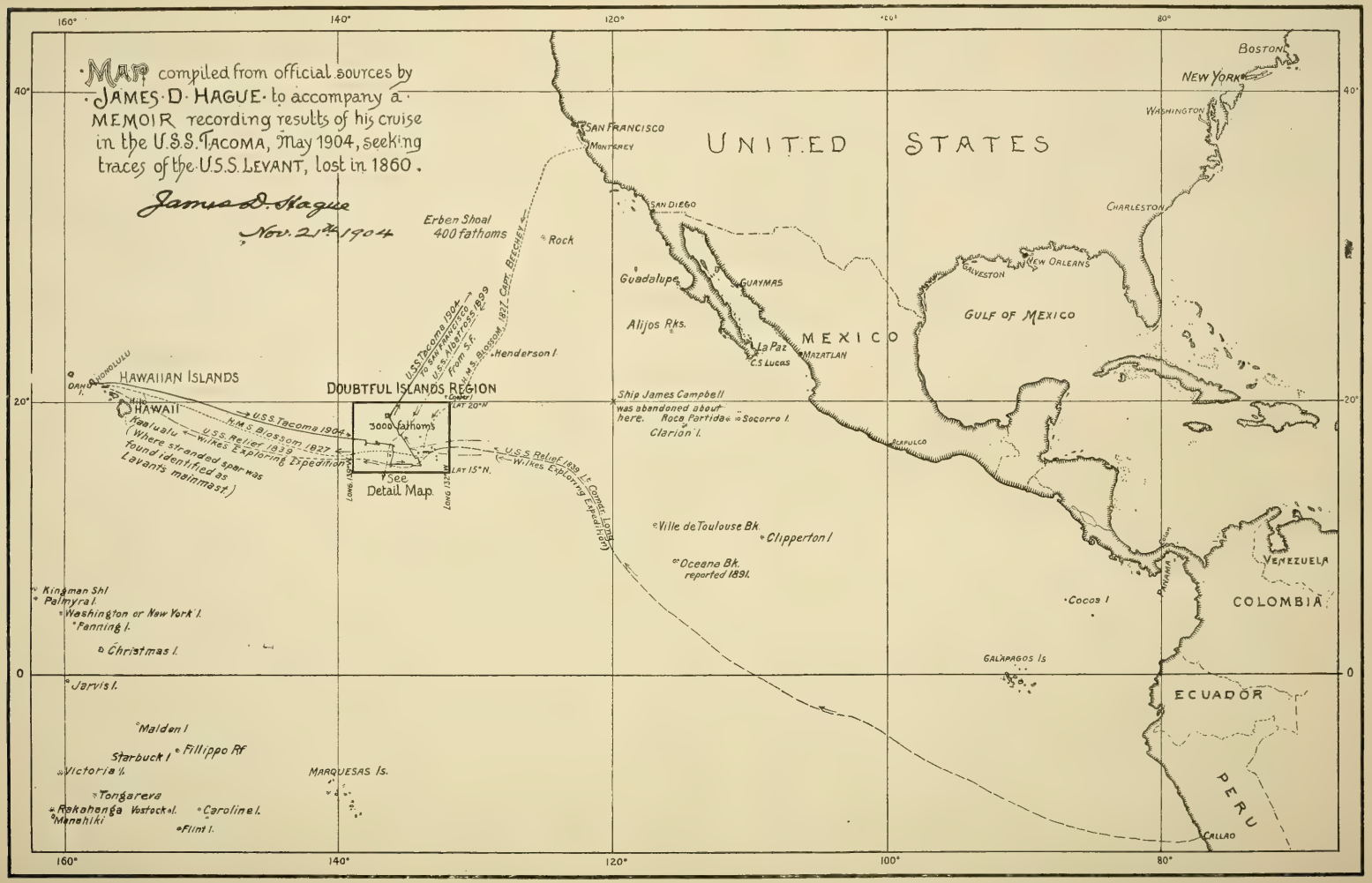
Data concerning the questionable existence of a reported island or islands in the North Pacific Ocean between Hawaii and Panama, with results of the cruise recently made by the U. S. ship Tacoma in search of such islands, with some discussion of the reasons for believing that the U. S. sloop-of-war Levant, which disappeared mysteriously in 1860 on her voyage from Hawaii to Panama, may have been wrecked on an island in this neighborhood, with the possible survival of some of the ship's company.

IN the North Pacific Ocean, about 1,000 to 1,200 miles east-southeast from Hawaii, somewhere between the meridians of 133 and 138 degrees of longitude west from Greenwich, and included within the fifteenth and twentieth parallels of north latitude, substantially in a direct line between the port of Hilo, on the Island of Hawaii, and the Bay of Panama (nearly 4,500 miles distant), there is a mid-ocean area covering about 200 miles in latitude by 150 or 200 miles in longitude, equal to 30,000 or 40,000 square miles, from which region during the past eighty years or more, from time to time, there have come occasional reports of an island or islands said to have been observed by passing navigators.

Nearly, if not quite, all these reports appear to have come originally, mostly more than fifty years ago, from cruising whalemen, who were practically the only voyagers who until lately ever found any occasion or good reason to visit this remote part of the Pacific in pursuit of business. The region lies beyond the usual tracks and sailing routes of commercial voyagers, and very few vessels of other classes excepting whalemen have had any occasion to traverse this unfrequented sea, which, if it contain no island, is not far from the center of the largest landless ocean area on the surface of the globe, while, if there be an island, it is perhaps the most remotely isolated land in the world.

The accompanying maps show, first, on the smaller scale, the general relations of this remote region to the American coast and to the Hawaiian Islands:

*Read in part before the Eighth International Geographic Congress at a meeting of the Section of Oceanography, September 13, 1904.



Map showing Relative Position of Doubtful Islands Region, the Hawaiian Islands, and the American Coast

and, secondly, in larger detail, some of the assigned positions of reported islands, reefs, or shoals, said to have been observed within the questionable area, together with the sailing tracks of the several vessels, not less than six, which from time to time during the past eighty years have been sent to explore the doubtful region. It is true that of all these reported islands, reefs, or shoals no one has ever yet been found by any of the vessels sent to seek them; but it is also true that a very large part of the questionable area from which the uncertain reports of observed islands have come has never yet been seen or visited by any of the exploring vessels sent out for such purpose, whose sailing tracks are shown on the accompanying maps.

The earliest of these expeditions appears to have been that of H. M. ship *Blossom*, in 1827, under the command of Capt. F. W. Beechey, who in his narrative (vol. 2, p. 88) gives a short account of an unsuccessful search for reported islands near the *Blossom's* route, and especially in the region of 16° north latitude and 130°–133° west longitude. He mentions Henderson's and Cooper's Islands by name, and has "New Island," in about latitude 17° north and longitude 136° west, on his track chart. His search was too limited to settle the question conclusively, but he says he saw none of the usual signs of land. His track chart shows that he made his examination between January 11 and 28, 1827. No soundings are noted thereon. In a footnote, page 88, he adds that he has heard that an island of moderate height has been seen by the *Sultan*, an American whaler, in latitude 15° 30′ north and longitude 134° west.

Ten years later, in 1837, Capt. Sir Edward Belcher, who had served in the above-mentioned expedition of the *Blossom*, revisited the region in command of H. M. ship *Sulphur* with the consort *Starling*. In his narrative of this voyage (vol. 1, p. 50) he furnishes a detailed track chart of their search within the area between 15° to 18° north latitude and 129° to 139° west longitude.

Careful attention is paid to showing the area visible in daylight and the space covered by night. All soundings, taken two-hourly, with as much line as the velocity of the vessel would admit, are noted at 50 to 65 fathoms, without bottom.

The following notes of his itinerary are drawn from Belcher's narrative:

"*June* 20–21.—The *Starling* was now directed to pursue a course so as to enter on the 130° meridian in latitude 17° north. I bore up to preserve a parallel course to her, and enter at 16° 30′ north, at which point another cluster of doubtful islands was reported to exist, as well as a continuous batch given us by the whalers in 1826 and 1827, as far as 135°, and which we then sought in the *Blossom*, without success. As the *Starling* would preserve a W. b. S. and the *Sulphur* a W. b. N. course through that region, avoiding the *Blossom's* track, they ought to have been found if they existed.

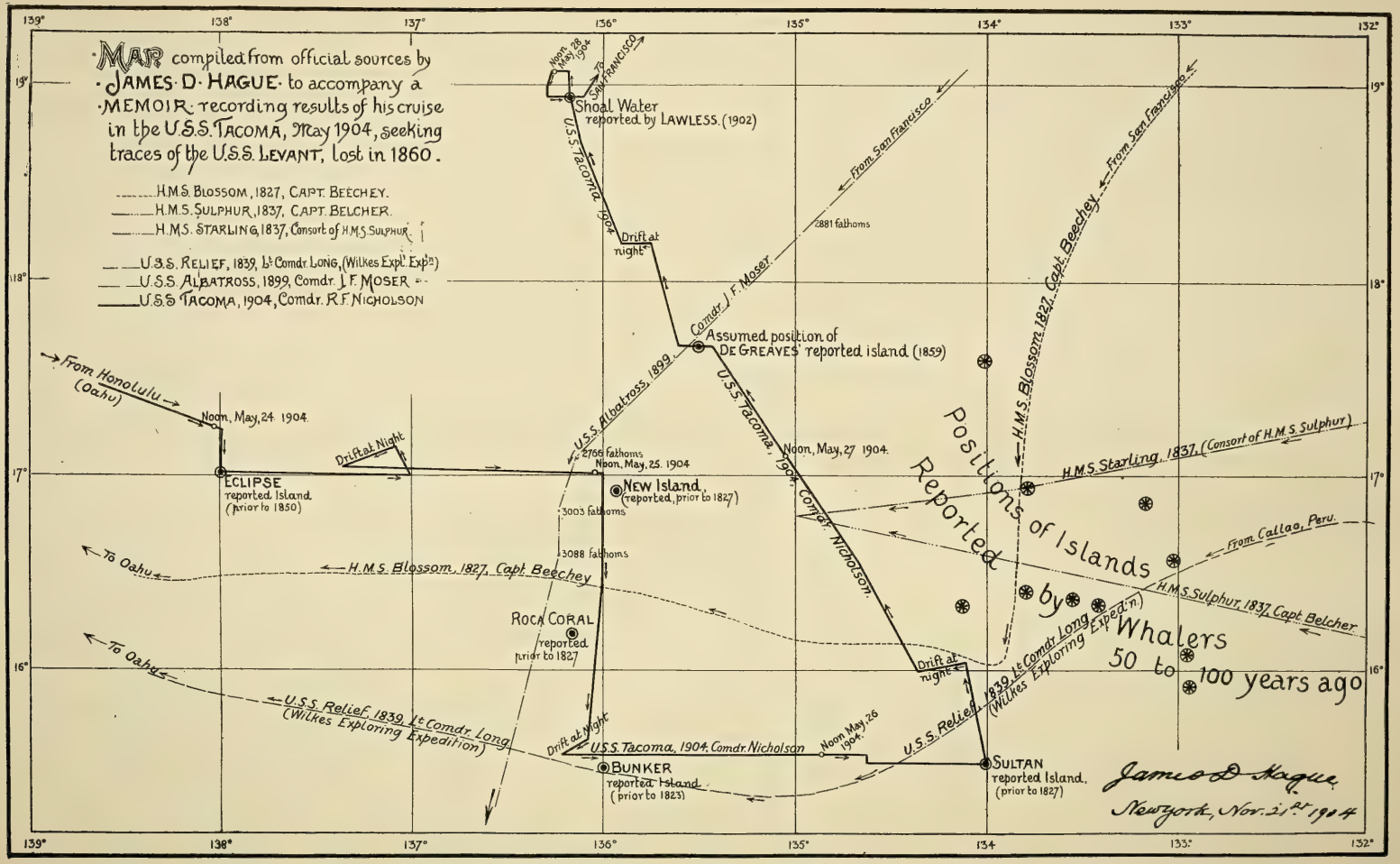
"*June* 22.—Wind light, medusæ more plentiful, and a few sticks floating, excited our hopes of finding land; but the current having been determined to set S. 86° W., this would bring them from Clarion Island.

"*June* 24.—Breeze variable, water smooth, tropic birds (*Phæton ætherius*) and frigate pelican (*Pelecanus aquilus*) also observed. As these latter birds do not go far from land, I am disposed to believe some one of these reports to be well founded, but the position erroneously determined.

"*June* 25.—. . . Should chance lead me in this direction again I shall certainly cross the meridian of today fifteen miles farther south.

"*June* 26.—Wind same, fewer birds but no symptoms of land.

"*June* 27.—On the 27th entered the limits assigned to whalers' discoveries.


MAP compiled from official sources by JAMES D. HAGUE to accompany a MEMOIR recording results of his cruise in the U.S.S. TACOMA, May 1904, seeking traces of the U.S.S. LEVANT, lost in 1860.
H.M.S. BLOSSOM, 1827, CAPT. BEECHEY.
H.M.S. SULPHUR, 1837, CAPT. BELCHER.
H.M.S. STARLING, 1837, Consort of H.M.S. SULPHUR.
U.S.S. RELIEF, 1839, Lt Comdr. LONG, (Wilkes Expl. Exp.)
U.S.S. ALBATROSS, 1899, Comdr. J.F. MOSER
U.S.S. TACOMA, 1904, Comdr. R.F. NICHOLSON
Noon, May 28, 1904
To SAN FRANCISCO
Shoal Water reported by LAWLESS. (1902)
U.S.S. Tacoma 1904
Drift at night
From San Francisco
2881 fathoms
Comdr. J.F. Moser
Assumed position of DE GREAVES' reported island. (1859)
From Honolulu (Oahu)
Noon, May, 24 1904.
Drift at Night
ECLIPSE reported Island (prior to 1850)
U.S.S. Albatross, 1899
2766 fathoms
Noon, May, 25. 1904
NEW ISLAND (reported, prior to 1827)
3003 fathoms
3088 fathoms
U.S.S. Tacoma, 1904, Comdr. Nicholson
Noon, May, 27 1904.
H.M.S. Blossom, 1827, Capt. Beechey
From San Francisco
H.M.S. Blossom, 1827, Capt. Beechey
H.M.S. Starling, 1837, (Consort of H.M.S. Sulphur)
From Callao, Peru.
H.M.S. Sulphur, 1837, Capt. Belcher
Positions of Islands Reported by Whalers 50 to 100 years ago
To Oahu
ROCA CORAL reported, prior to 1827
To Oahu
U.S.S. Relief, 1839, Lt Comdr Long (Wilkes Exploring Expedition)
Drift at Night
U.S.S. Tacoma, 1904, Comdr. Nicholson
Noon May 26 1904.
BUNKER reported Island (prior to 1823)
Drift at night
U.S.S. Relief, 1839, Lt Comdr Long (Wilkes Exploring Expedition)
SULTAN reported Island, (prior to 1827)
James D Hague
Newyork, Nov. 21st 1904
139° 138° 137° 136° 135° 134° 133° 132°
19° 18° 17° 16°

—· Map showing assigned Positions of reported Islands in the Doubtful Region ;—
—· and the Sailing Tracks of Vessels sent to seek them ·—

"*June* 28.—Crossed *Blossom's* track.

"*June* 29.—Passed over many positions assigned—no signs of land.

"I have been thus minute upon this subject, as I can not divest myself of the impression that land exists in this neighborhood. So many assertions can hardly rest on imagination."

The sailing tracks of the *Sulphur* and *Starling* within the above-indicated area appear on the accompanying maps as shown on an old chart of the North Pacific Ocean (copyrighted in 1849, with additions to 1864, by E. and G. W. Blunt, New York), and a number of islands, several separate and some in two small groups, are copied from the same source.

In 1839, two years after Sir Edward Belcher's search in the *Sulphur*, one of the vessels of the United States exploring expedition, the *Relief*, on her voyage from Callao, Peru, to the Hawaiian Islands, was ordered by Admiral Wilkes to visit this region of questionable islands under instructions addressed to Lieut. Commander A. K. Long, as follows:

"U. S. SHIP VINCENNES,
"*Callao, July 12th, 1839.*

"SIR: You will proceed from this port to Oahu, Sandwich Islands, taking in your route the American group of islands in latitude 16° 10′ N., longitude 134° 50′ W. These islands have been unsuccessfully looked for by Captain Beechey in this position. You will therefore make the latitude in 130° west, to the eastward of their supposed situation, and run along it until you reach 140° W.; thence direct to Oahu."

The accompanying map shows the sailing track of the *Relief*, covering more than fifteen degrees of longitude, along the latitude of 15° to 16° north. I have not found in Admiral Wilkes' narrative any detailed report of this cruise of the *Relief*, but it is safe to assume that no land was discovered in the region referred to.

The Hydrographic Office of the Navy Department has published "Reported Dangers in the North Pacific," and in the "Supplement 417, 1880," No. 563, a mention is made of "a group of islands" in latitude 16° 30′, with the authority, "Krusenstern, from American Whalers," and an "island" in latitude 15°30′, longitude 136°, Captain Bunker, 1823.

For some of the foregoing interesting references, with data from Blunt's chart, I am indebted to Prof. George Davidson, of the University of California, during many years chief of the Pacific Coast Division of the United States Coast Survey, who writes as follows concerning the reported islands:

"I judge that the group of ten islets, close together, really refer to one or two islets, and that its position was reported by some whalers to many others, who, each independently, reported it without having seen it. No body of whalers could have so closely determined the positions indicated. The eastern compact group of four may really refer to the larger group. The two islands, "New" and "Roca Coral," may refer to one island, with a longitude much west of the former groups.

"One thing seems to me probable, that *there is some danger to navigation in that region*. And now that our commerce is rapidly increasing and these reported dangers lie directly in the route of sailing vessels to Australia from San Diego and San Francisco, it becomes incumbent upon our government to make an exhaustive survey of that region.

"Whatever has been done by our vessels in that region has been only incidental to other duties, and only satisfactory on the line or lines on which they sailed. Some naval officer and some vessel fitted for such work should be employed a full season, if necessary, to make an exhaustive investigation of the region of the reported dangers."

During the sixty years following Sir Edward Belcher's search in the doubtful region (1837), there were, so far as I am aware, no trustworthy observations of land reported in that quarter, unless the somewhat vague statements and uncertain memories of old-time whalemen be excepted. Nevertheless nearly all the standard charts, maps, and globes continued to show in that neighborhood, at least until lately, one or more islands of doubtful existence and position. It is said, moreover, that one or more vessels have visited the field on various occasions seeking guano islands without finding any.

In August, 1899, the Fish Commission steamer *Albatross*, Commander Jefferson F. Moser, with a party of scientific explorers under the direction of Mr Alexander Agassiz, left San Francisco for the Marquesas, with instructions to traverse the doubtful region, keeping a careful lookout for land within sight. From Captain Moser's reports I draw the following notes:

"Shortly after midnight, September 2d, we arrived in the vicinity of the danger previously referred to, and marked '(?) Island' on H. O. chart No. 527, in lat. 17° 10′ N., long. 136° 3′ W., and reported under the name of 'Island,' 'New Island,' 'Roca Coral,' etc. This danger had previously been searched for by H. M. S. *Rattlesnake* and H. M. S. *Sulphur*. The following soundings were obtained by the *Albatross* in that vicinity:

"Station AA No. 8, lat. 17° 13′ N., long. 136° 09′ W., 2,776 fms.

"Station AA No. 9, lat. 16° 62′ N., long. 136° 12′ W., 3,003 fms.

"Station AA No. 10, lat. 16° 38′ N., long. 136° 14′ W., 3,088 fms."

. . . . . .

"At each of the first two stations the operation of sounding occupied about an hour, and during those times a bright lookout was kept for land, without result. At the last station a haul of the beam trawl was made after sounding, the operation occupying from 8.04 a. m. to 3.45 p. m. The lookout kept at this time for land was likewise without result. The weather while in this vicinity was clear and pleasant, with light breeze from northeastward and smooth sea; horizon generally clear. It was noted that at several points close to the horizon low leaden cloud masses assumed a hard, sharp, fixed form, having the outline of and resembling distant high islands. Tropic birds were constantly about, and the previous day (Sept. 1st) several petrels were observed. On the 3d sharks and tropic birds were seen. The presence of this animal life might add strength to the presumption that land was somewhere near, but similar animal life accompanied the vessel on the entire voyage, and was no more abundant in this locality than at any other point on the course. My opinion is that this danger does not exist* *within sight, under fair conditions, of the locality over which the soundings were made.*"

Since the foregoing report was made all indications of islands within this doubtful region seem to have been omitted from later charts issued by the United States Hydrographic Office, which show in that neighborhood only the deep soundings recorded by the *Albatross*.

Within recent years the establishment of a steamship line between San Francisco and Tahiti, of which the sailing route lies more or less within the questionable field, has given further opportunity for occasional search there.

In March, 1902, Capt. Robert T. Lawless, commanding the steamship *Australia*, of the above-mentioned line, observed, as he believes, certain indications of shoal water, which he reported as

*The words in italics were added by Commander Moser in June, 1903, to his report, originally made in September, 1899, after further consideration of the possibility that the island may exist beyond his range of vision from the *Albatross*.

follows: "On my way to San Francisco from Tahiti on the morning of March 17, 1902, in the latitude (see map) of 18° 56′ N., longitude 136° 10′ W., at 5.30 a. m., I passed two patches of what appeared to be, and no doubt was, shoal water. It was blowing a strong trade wind at the time and the sea was too rough to lower a boat to sound, which I should have done had it been smooth. Meeting a shoal so suddenly and unexpectedly, I did not leave the bridge for several hours, thinking I might meet others. I had to alter the ship's course two points to avoid the patches, as they were right ahead when first seen. The course from Tahiti does not lie in the direction of these shoals, but strong trades compelled me to keep off in that direction that I might carry fore-and-aft sail. The latitude can be relied on to one or two miles. The longitude to, say, five miles." Captain Lawless further writes: "It will be seen that at 5.30 a. m. the sun could cast no cloud shadows on the water, the rifts in the clouds could reflect no bright streaks, and as there were two separate patches, divided by a clear channel, it could not be attributed to any discoloration caused by whales, nor could it be schools of fish, as the approach of the steamer would frighten them away. Although the sea was fairly rough, it did not break, showing that there must be 30 or 40 feet of water over the shoal, but I venture to say that in a storm, when the waves are 15 to 20 feet high, it would break. By consulting the chart, it will be seen that this part of the ocean is used but very little, and shoals, or even small low islands, might still exist there which are not now charted."

This observation of shoal water, as thus reported by Captain Lawless, indicating the possible existence of a shoal region, where reefs and islands might naturally occur, did much to revive and stimulate afresh the interest, not only of the Hydrographic Office, for its importance to navigators, but also of all persons who for any conceivable reason might in any way be concerned in the question of the existence of islands, reefs, or shoals in that part of the ocean.

Among such persons was one Capt. John De Greaves, then living at Honolulu, and there sometimes formerly known as the King's "scientific adviser," who, it was said, during many years prior thereto had constantly asserted his positive knowledge of such an island in that region referred to, claiming to have discovered and landed upon such island, and to have found deposits of guano thereon, in the summer of 1859, while on a voyage from the port of Honolulu, Hawaii, to the port of Callao, Peru. The memories of his visit having been apparently aroused by the announcement of Captain Lawless's observation, he gave a very full and minutely detailed narrative of his adventure to a local press reporter, who promptly sent the story to the New York Sunday *Herald*, in which paper it was published on May 4, 1902.

About this time certain incidental circumstances had led by chance to the revival of a very deep personal interest, which I had strongly felt during more than forty years, in the generally forgotten mysterious fate of the United States sloop-of-war *Levant*, which having sailed on September 18, 1860, from the port of Hilo, Hawaii, for the port of Panama, has never since been heard from by any trace whatever, unless it be in certain wreckage found on the south shore of Hawaii, in June, 1861, there and then identified by local authorities as wreckage from the *Levant*.

When I read in the *Herald* on May 4, 1902, that De Greaves had sailed from Hawaii for Callao in the summer of 1859, one year before the sailing of the *Levant* from practically the same point of departure, and, so far as sailing courses might be concerned, for the same destination, at the same time of

year, liable to similar conditions of season, weather, prevailing winds and currents, it seemed a reasonable supposition that the *Levant* might follow, in 1860, the leading vessel on her voyage of 1859 in substantially the same courses, as one arrow might follow another, shot from the same bow and aimed at the same target. According to De Greaves's story, when he was about a thousand miles east of Hawaii, or (see map) in longitude 136° and north latitude 17°, he discovered an island, about 50 to 70 feet high and two miles long, right ahead, about nine o'clock in the morning. If the *Levant* had reached substantially De Greaves's point of discovery in the night, it is more than probable she would have sailed in the darkness onto the island and made shipwreck there.

Although De Greaves's story, on careful inquiry and search of records, was presently found to have been largely, if not wholly, invented for the occasion,* nevertheless the possibility that the *Levant* might have been wrecked on some island, somewhere in her sailing track between Hilo and Panama, seemed most reasonable, especially in view of certain indications of the above-mentioned wreckage that the ship had not foundered in mid-ocean (as once determined by act of Congress), and had not been dismasted in a storm, but had been broken to pieces on rocks, and, further, in view of the much increased probability that such rocks, perhaps a low reef, perhaps a habitable island, might be found in the neighborhood of Captain Lawless's recently discovered shoal.

I had the honor to bring the matter to the attention of President Roosevelt in June, 1903, and thereafter, upon presentation and consideration of the known facts at the Navy Department, the Secretary of the Navy, Hon. W. H. Moody, determined to send an expedition, as soon as one or more suitable vessels could be spared for the service, to finally settle the question of the existence or non-existence of any shoal, reef, or island in the doubtful region.*

This determination, as originally formed, contemplated the sending of one, or perhaps two, vessels suitably equipped for deep-sea sounding, † of large bunker capacity, carrying sufficient coal for a cruise long enough to traverse the entire field and overlook in daylight every square mile of the questionable area. No such vessel had yet been found available for the proposed work, when in May, 1904, the *Tacoma*, a newly built cruiser, was about to make a trial and practice voyage from the Bremerton Navy Yard to Honolulu and back to the Pacific coast. Although the *Tacoma's* coal-carrying capacity was too small to allow more than a few days' detour, it was thought expedient for her on the return voyage to visit the locality of Captain Lawless's reported observation and the assigned position of De Greaves's alleged discovery for such reconnaissance as might be feasible under existing conditions.

* Presumably to stimulate renewed interest in further search for guano islands.

* The late Rear Admiral H. C. Taylor, at that time Chief of the Bureau of Navigation, manifested a very strong interest in the proposed search, and he repeatedly expressed his earnest desire to see it conclusively accomplished.

† Deep-sea soundings, showing the depressions and elevations of the ocean bottom, may often give significant indications of submarine peaks, plateaus, or ridges, which, if followed up, may lead to the discovery of shoals or islands visible at the surface. The deep-sea soundings in the North Pacific, made some years ago by the U. S. ship *Tuscarora* while sounding for a cable line from San Francisco to Honolulu, under the command of Rear Admiral Erben, discovered a shoal region in which the depth of water suddenly changed from more than 2,200 to less than 400 fathoms and deepened again as suddenly, indicating the crossing of a submarine peak or ridge. This shoal region lies in 33° north and near 133° west, about 900 to 1,000 miles due north of the doubtful field here under consideration.

The *Tacoma* was not furnished with any deep-sea sounding apparatus, and her search in that regard was therefore only superficial.

In his report of the cruise of the *Tacoma*,* Commander R. F. Nicholson writes as follows:

"Leaving Honolulu on May 19, I proceeded to the latitude indicated and, upon the assumption that the latitude was nearly correct, and that the greatest errors in the reported position would be in longitude, commenced search on May 24 at longitude 138 west, where, upon an old map seen in Honolulu, an island is shown marked Eclipse. This is one degree to the westward of the position indicated by the department. We ran on that parallel to longitude 136° west, reaching the vicinity of the *Albatross's* search and soundings of 3,000 fathoms. The atmosphere was clear and the horizon well defined. From aloft any land could have been seen at least ten miles on either side of our track. At night the engines were stopped. I then proceeded to visit in order the reported positions of islands as given below and as are shown on the accompanying tracing of our track: Bunker's Island, lat. 15° 30′ N., long. 136° W., reported by Captain Bunker in 1823; Sultan's (American whaler), reported in lat. 15° 30′ N., long. 134° W., prior to 1827; Groupe, lat. 16° 30′ N., long. 134° 30′ W., authority of Krusenstern, from American whalers, reported prior to 1849; De Greaves, English resident of Hawaii, asserts having landed on an island (see map) in lat. about 17° 40′ N., long. about 135° 30′ W., whilst mate on the British bark *General Wool* in 1858; shoal (see map) reported by Captain Lawless in lat. 18° 56′ N., longitude 136° 10′ W., who says he saw discolored water, which he believed to be shoals, but did not stop his vessel, the *Australia*, to sound.

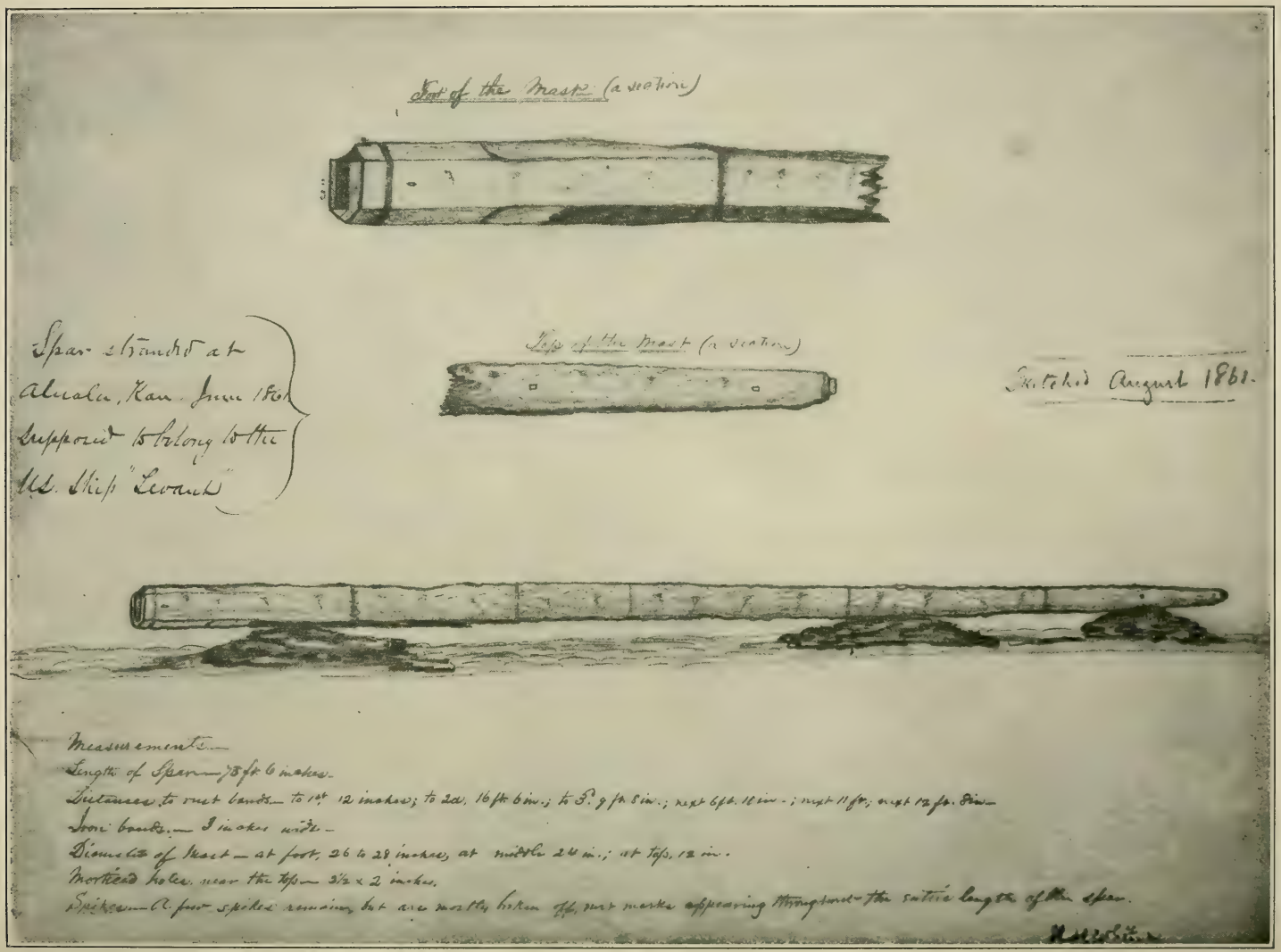
"Captain Lawless states that he was sure of his position within one mile of latitude and five minutes of longitude. I sounded in given position of Lawless's shoal and in its vicinity, getting no bottom at 280 fathoms. During the search, which lasted four days, neither land, shoals, nor signs of land were seen. In fact, the locality was remarkable for the total absence of birds."

The above-stated result of the *Tacoma's* search is absolutely conclusive as far as it concerns the ocean area actually seen from the track line of the ship. The total area thus examined is probably about one-quarter to one-third of the questionable region, assuming that area, as hereinbefore stated, at about 30,000 to 40,000 square miles, whereof about 10,000 square miles have now been actually seen in searches made by the *Tacoma* and the *Albatross*.

The cruise of the *Tacoma* has therefore negatively and conclusively disposed of half a dozen or more reported islands as charted in certain defined positions, and it has definitively eliminated from further consideration of doubtful reports an area of about 10,000 square miles, leaving a still questionable region of twice or three times that area open to further search.

Reference to the map will show that this region, still unexplored and unvisited by any (excepting the *Albatross*) of the above-mentioned searching vessels, lies in latitude somewhere between 17° and 20° north and in longitude between the meridians of 133° 30′ and 136° west, an area of about 30,000 square miles or more, nearly equivalent, say, for example, to the area of the State of Maine. It is readily imaginable that such an island as the whalemen have reported may have been observed by them within this field, which lies wholly out of sight of vessels following the sailing tracks shown, further south, in the accompanying map, and it may be noted that this field of possibilities lies due east of

* By direction of the Secretary of the Navy I joined the *Tacoma* at Honolulu, for the purpose of participating personally in her exploration of the doubtful islands region and in seeking traces of the lost *Levant*, whose departure from the same port, on her fatal voyage, I had witnessed forty-four years before.


Foot of the Mast (a section)
Spar stranded at
Aleala, Kau. June 1861
supposed to belong to the
Ill. Ship "Levant"
Top of the Mast (a section)
Sketched August 1861.
Measurements—
Length of Spar—85 ft 6 inches.
Distances to mast bands— to 1st 12 inches; to 2d, 16 ft 6 in.; to 3d 9 ft 8 in.; next 6 ft. 10 in.; next 11 ft.; next 12 ft. 8 in.
Iron bands— 3 inches wide.
Diameter of Mast— at foot, 26 to 28 inches, at middle 24 in.; at top, 12 in.
Mortised holes near the top— 3½ x 2 inches.
Spikes— A few spikes remain, but are mostly broken off, rust marks appearing throughout the entire length of the spar.

Sketch of Mast of U. S. Sloop *Levant*. The Mast was washed ashore on one of the Hawaiian Islands

Lawless's shoal, reported in latitude 18° 56′ north, while the older charts all indicate islands in the neighborhood that have been reported long ago in latitudes little north of 20° and south of 17°.

There is another shred of circumstantial evidence indicating the existence of an island in this neighborhood. Some years ago, about 1889 (?), the ship *James Campbell* was abandoned near latitude 20° north and longitude 120° west, 800 miles from the coast to windward and 2,300 miles from Hawaii to leeward. Two boats left the ship, steering for Hilo, Hawaii. The larger and better boat, well adapted to sailing, contained the captain with his wife and girl baby and several sailors; the second boat carried five or six sailors. The captain's boat made sail, and at first towed the other boat, but after two or three days parted company, leaving her behind. After 23 days the second boat's crew reached Hilo, expecting to find the captain's boat already there. The weather had been favorable and the sea smooth, and nothing had occurred to account for the failure of the captain's boat to arrive. It has never been heard from. It is thought by some that the captain may have sighted and landed upon an island, where, if he found it habitable, he might have preferred to stay rather than take the risk of a further voyage in an open boat with wife and child.

The results of the *Tacoma's* search throw no light upon the mysterious fate of the *Levant*, unless the certainty that there is no island or reef where the cruiser has looked for one may, in view of all the now known facts, be regarded as an indication that there must be such an island or reef of rocks elsewhere on which the *Levant* was wrecked, since it now seems almost unquestionable that the *Levant* was broken to pieces on a reef or island somewhere in her sailing track between Hilo and Panama. It is now known from his official records that when the *Levant* sailed from Hilo her commander, William E. Hunt, intended to take the northern course, heading eastward toward the coast of California, rather than southward toward the equator, and thus probably traversing the very region in which the questionable island is supposed to be situated. Within nine months after her departure a drifting spar and a part of a lower yard were found on the Hawaiian shore 75 miles south of Hilo. This spar was examined and identified as the mainmast of the *Levant* by three witnesses, one of whom was the pilot who had taken the *Levant* in and out of the port of Hilo and who knew the dimensions of her spars.

It has been generally believed that the *Levant* capsized or foundered in some tidal wave or overwhelming sea; but in such case her mainmast would probably have gone to the bottom with the ship, whereas the mainmast found on the shore of Hawaii would seem to have been torn out of the vessel when broken to pieces on a reef. Certain sketches, copies of which are submitted herewith, carefully made shortly after the mast came ashore, show it to be 73 feet long, whole from heel to top, not broken off as it might have been if the ship had been dismasted in a storm at sea, but complete, showing in detail the framing of the mast at the heel or step, indicating that the ship from which it came had not foundered and had not been dismasted at sea, but must have been broken to pieces on a reef, and that the unbroken mast must thereafter have been detached and drifted away with the wreckage of the lower yard that was found at the same place on the south shore of Hawaii.*

*These sketches were made by Mr H. M. Whitney, of Honolulu, in August, 1861, a few weeks after the finding of the wreckage, which had then already been identified as the mainmast of the *Levant*, and so reported to the Navy Department, at Washington. Mr Whitney visited the place where the wreckage came ashore and made the sketches, by special request of

If the *Levant* was wrecked on a reef within the region here considered (or, indeed, much farther east) and thereafter broken to pieces in heavy surf, the prevailing westerly current might have carried her drifting wreckage in a few months' time to the south end of Hawaii, where the spar, identified as her mainmast, was found. This westerly current is usually very strong, with slight southerly variations. The *Tacoma*, lying to during the night, with engines stopped, drifted a mile per hour in a west-southwesterly direction. The drifting spar, if moving with a velocity of half a mile to a mile per hour, would travel from 300 to 700 miles per month. The *Levant* sailed from Hilo in September, 1860, and the drifting wreckage was found on the Hawaiian shore in June, 1861, nearly nine months thereafter.

If the *Levant*, sailing in the night with a smooth sea, struck upon the reef of an ordinary coral island, especially at high tide, her ship's company might possibly have landed without the loss of a single life, in which event there would have been many and still might be some survivors whose chances of living till now on a fairly habitable and healthful island might, perhaps, have been far more favorable than elsewhere, exposed as they would have been not only to the constant risks of life under existing conditions of modern civilization, but also to the hazards of war, which was their vocation and in which they would have been actively engaged a few months later if they had duly reached their destination at Panama.

In this connection I may venture to recall the interesting incident that Edward Everett Hale's Philip Nolan, "The Man without a Country," ended his romantic career on the *Levant* on this her last and fatal voyage, since in the author's imagination he must have been aboard when she last put out to sea from the port of Hilo. There may have been a whole ship's company of men, now without a country, cast away on this mysterious island about forty-four years ago, some of whom may be still watching for a sail.

This would be, indeed, a marvelous thing, but it is not beyond the range of possibility. The mutineers of the *Bounty* lived on Pitcairn Island 18 years before they were found there, and the extreme and solitary isolation of this supposed land would fully account for the long undiscovered seclusion of the castaways. If there be an island in this uttermost part of the sea, and if, sooner or later, it should be found with survivors of the *Levant*, its story might well be thought the strangest sea romance in the history of the world. The venerable author of "The Man without a Country" has manifested a very keen interest in all that pertains to the recent search for the *Levant* and in the efforts to solve the mystery of her fate.

On my return to San Francisco after the cruise of the *Tacoma* I received a note of welcome from Dr Hale, which he had sent to await my coming. He wrote, "If you have found dear Phil Nolan bring him at once to this house; I will adopt him as my grandfather."

interested parties, in order to preserve recorded evidence of the dimensions and descriptive details of the spar. The sketches were laid aside shortly after and were never brought to light again until my recent visit to Honolulu, more than forty years thereafter, in search of the desired information, when Mr Whitney found and placed them at my disposal.

Recent inquiry shows that the *Levant's* lower masts were put into the ship at the Boston navy yard, in 1858; but no record of that work has yet been found there, which affords any information for comparison of dimensions or details, which might serve to identify the mast found at Hawaii or confirm its supposed relation to the *Levant*.

THE UNITED STATES GOVERNMENT TELEGRAPH AND CABLE LINES

SOME very notable achievements are enumerated in the report for 1904 of General A. W. Greely, Chief Signal Officer, U. S. A. A wireless telegraph system has been established between Cape Nome and Fort St Michael, which in an afternoon easily transmits 5,000 words across the 107 miles of water. The apparatus was invented entirely by the Signal Corps engineers. A cable of 596 miles, of American make, has been laid between Sitka and Valdes. During the year 55,559 messages were transmitted on the government lines, of which 31,020 were commercial and 26,539 official messages. The revenue of the lines is increasing very rapidly. Of the Alaskan system General Greely says in his report:

"The undertaking is unique in the annals of telegraphic engineering, whether one considers the immense extent of territory, its remoteness from the United States, the winter inaccessibility of the regions, the severity of the climate, the uninhabited and trackless districts, or the adverse physical conditions. If plotted on a map of the United States this system would reach from Wyoming to the Bahamas, off the coast of Florida. The cables used would reach from Newfoundland to Ireland, and the land lines from Washington to Texas.

"Its totality also comprises elements not elsewhere combined in a single system—submarine, land, and wireless methods, all worked as one component and harmonious system. The entire construction of 3,625 miles includes not only 2,079 miles of cable and 1,546 miles of land lines, but also a wireless system of 107 miles.

"The United States has brought southeastern Alaska, the Yukon Valley, and the Bering Straits region into telegraphic communication with the rest of the civilized world. There yet lacks, to complete the dream of a half century since of telegraphically uniting America and Asia via Bering Straits, a cable to the Asiatic shore and a Russian land line of about 1,500 miles to Nikolaevisk.

"The Signal Corps wireless station at Nome could communicate with a similar station on the Kamchatka coast, but the infertile and sparsely inhabited country thence to the nearest Russian station of Nikolaevisk renders any such enterprise unlikely.

"It is important to note that the completion of the Alaskan lines perfects the military intercommunicating system of the United States. The President or the Secretary of War can now reach, over strictly American lines of telegraph and cable, every important military command from the icy waters of Bering Strait to the tropical seas of the Sulu Archipelago, with the exception of the legation guard at Pekin.

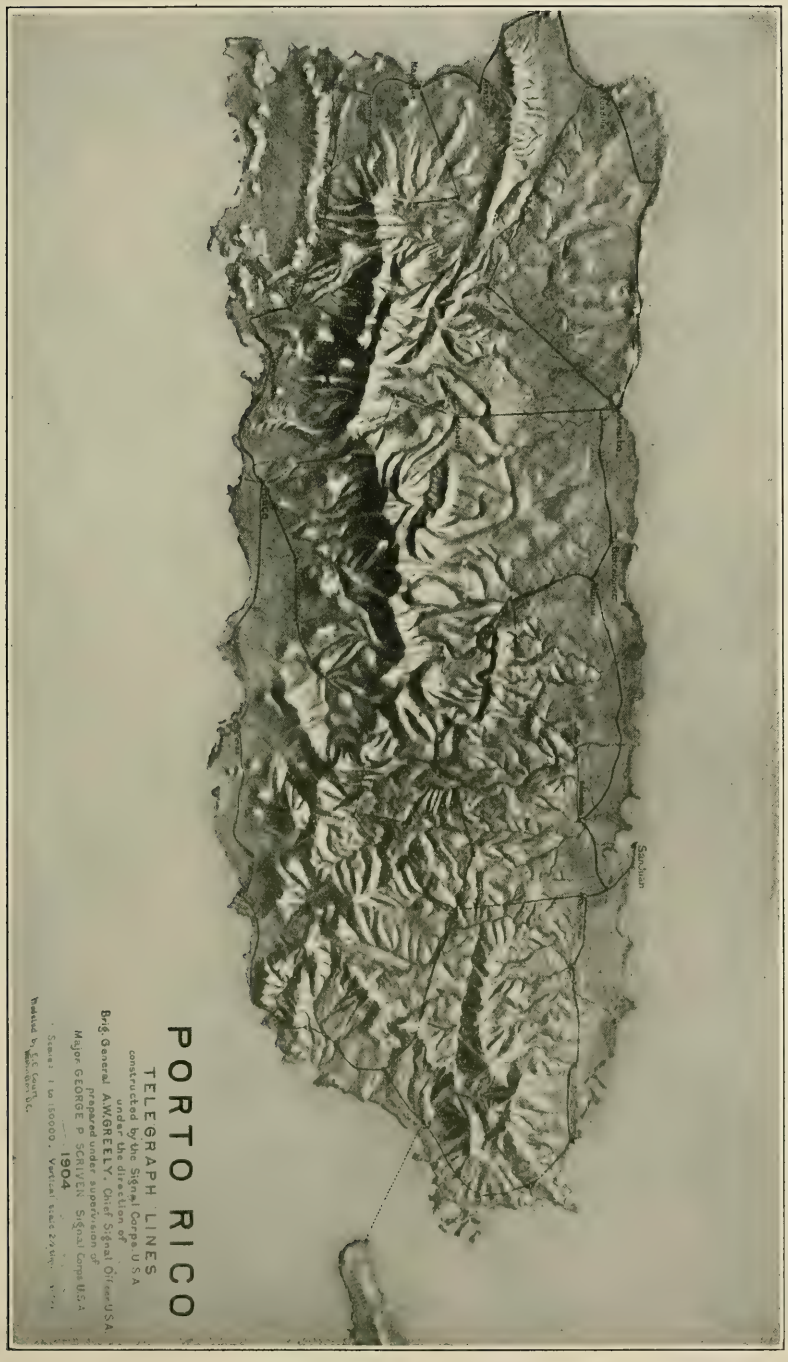
"The Alaskan cables were manufactured in the United States, and are the first American-made cables to be used on a long line.

"The seamless rubber cable between Sitka and Seattle, 1,070 miles in length and laid in an average depth of 1,000 fathoms and in an extreme depth of 1,700 fathoms, in addition to being less expensive in its original cost, has a transmitting power greater by 25 per cent than was mathematically calculated on the basis of trans-Atlantic gutta-percha cables.

"The cable system of southeastern Alaska, 413 miles in length, was operated without interruption during the entire fiscal year, and a similar absence from interruptions has marked the extension of 1,070 miles to Seattle.

ALASKA
TELEGRAPH AND CABLE LINES
constructed by the Signal Corps U.S.A.
under the direction of
Brig General A.W. GREELY, Chief Signal Officer U.S.A.
prepared under supervision of
Major GEORGE R. SCRIVEN, Signal Corps U.S.A.
1904
SIBERIA
BRITISH
COLUMBIA
GULF OF ALASKA

Relief Map of the Philippine Islands, constructed by the U. S. Signal Corps, under the direction of General A. W. Greely


PORTO RICO
TELEGRAPH LINES
constructed by the Signal Corps U.S.A.
under the direction of
Brig. General A.W. GRELY, Chief Signal Officer U.S.A.
prepared under supervision of
Major GEORGE P. SCRIVEN Signal Corps U.S.A.
1904
Scale 1 to 150000. Vertical scale 2 mis. = 1 in.
Printed by U.S. Govt. Ptg. Office.
Mayaguez
Ponce
San Juan

"The land system of 1,497 miles was scarcely completed in June, 1903, when extensive forest fires in the valley of the Tanana, ranging for a distance of 250 miles along the line, destroyed various portions, aggregating 100 miles in length. By arduous effort this line was rebuilt and the system thrown open as a whole to the general public for commercial business before winter commenced. It has since been operated with unusual success, although interruptions here or there have been frequent, 206 breaks in all, due mostly to blizzards, forest fires, sleet storms, and high winds."

THE PHILIPPINE LINES

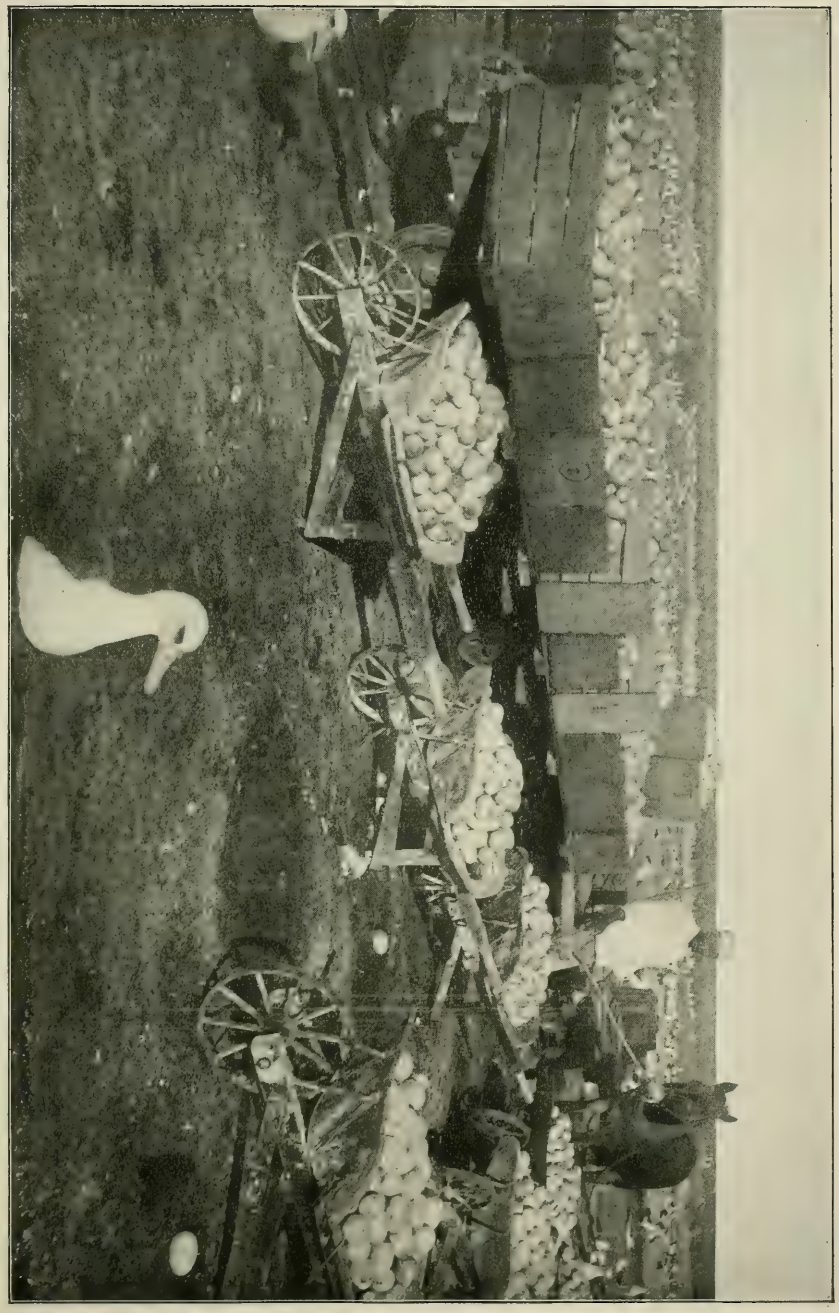
About 3,000 miles of the Philippine system has been transferred by the Signal Corps to the civil government, leaving 7,000 miles of cable and telegraph still in the hands of the Signal Corps. If the Signal Corps had charged for every telegram and telephone on the scale of the Eastern Extension Telegraph Company, the only telegraph company in the islands, it would have received nearly $8,000,000 in tolls. The total cost to the United States for the construction and operation of the 10,000 miles of lines in the Philippines has been less than one-third of this amount.

A BIRD CITY

AT the extreme end of the Hawaiian group there is a little island, about 3 miles long and 1½ miles wide, where one of the most remarkable sights in the world is to be seen. Hundreds of thousands of birds make it their breeding place. The birds have divided the island into lots and squares, as the surveyor divides the city into lots, and each lot is reserved for a particular species of bird. Mr Walter K. Fisher, of the Bureau of Fisheries, who in 1902 spent a week on this island (Laysan Island), has recently published the official story of his visit there.* Perhaps the most interesting bird is the beautiful white-breasted albatross. The bird is friendly. "It might perhaps be difficult to convey," says Mr Fisher, "the pleasure I experienced when, standing in a group of albatrosses, one came up and peered into my face, and, finding my intentions good, proceeded to examine inquisitively the top of my tripod. Many of the young albatrosses would allow themselves to be stroked after a ludicrous show of displeasure, and would soon appear as if they had known us always."

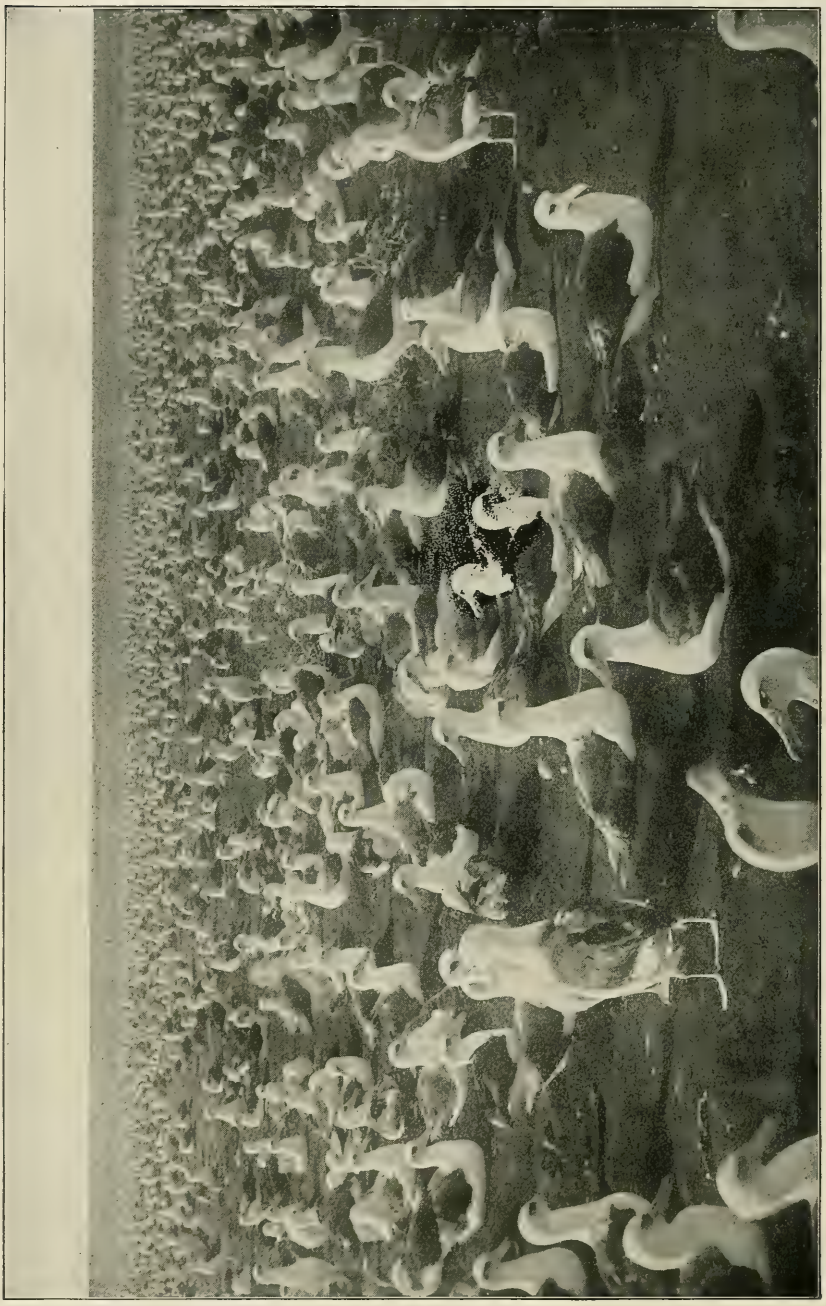
The albatross is fond of dancing. "Two albatrosses approach each other, bowing profoundly and stepping rather heavily. They circle around each other, nodding solemnly all the time (see picture 1). Next they fence a little, crossing bills and whetting them together, pecking meanwhile, and dropping stiff little bows. Suddenly one lifts its closed wing and nibbles at the feathers underneath, or, if in a hurry, merely turns its head and tucks its bill under its wing (see picture 2). The other bird during this short performance assumes a statuesque pose and either looks mechanically from side to side or snaps its bill loudly a few times. Then the first bird bows once, and, pointing its head and beak straight upward, rises on its toes, puffs out its breast, and utters a prolonged nasal groan, the other bird snapping its bill loudly and rapidly at the same time (see picture 4).

*"Birds of Laysan Island, H. I.," by W. K. Fisher, Bureau of Fisheries, 1904.



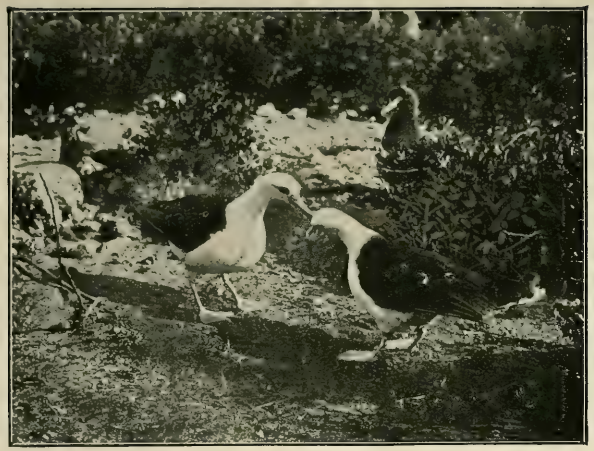
Collecting Albatross Eggs on Laysan Island, Hawaiian Islands

From T. S. Palmer, Department of Agriculture



From T. S. Palmer, Department of Agriculture

Albatrosses on Laysan Island, Hawaiian Islands

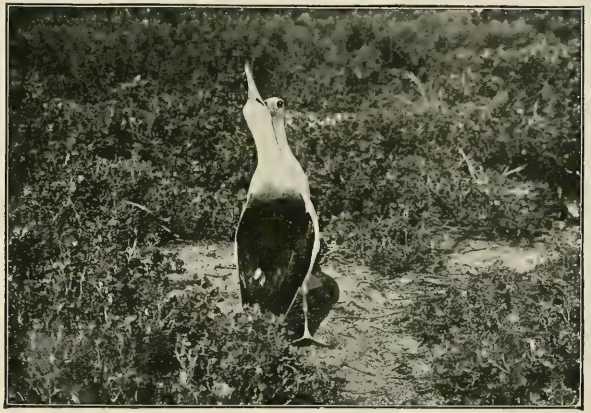


PICTURE 1.—First Steps in Favorite Dance and "Song" of the Albatross, *Diomedea immutabilis*

Photos from Walter K. Fisher, Bureau of Fisheries.

PICTURE 2.—Second Step in the Albatross Dance.

PICTURE 3.—Finale of Dance—the Duet.



PICTURE 4.—More Common Ending of Dance—One "Singing," the Other Snapping Beak.

"Sometimes both birds raise their head in air, and either one or both utter the indescribable and ridiculous bovine groan (see picture 3). When they have finished, they begin bowing at each other again, almost always rapidly alternately, and presently repeat the performance, the birds reversing their rôle in the game or not. There is no hard and fast order to these antics, which the seamen of the *Albatross* rather aptly called a 'cake-walk,' but many variations occur.

"Occasionally one will lightly pick up a twig or grass straw and present it to the other. This one does not accept the gift, however, but thereupon returns the compliment, when straws are promptly dropped, and all hands begin bowing and walking about as if their lives depended upon it. If one stands where albatrosses are reasonably abundant, he can see as many as twenty couples hard at work bowing and groaning on all sides and paying not the slightest attention to his presence."

In spite of this excellent use of all the space at their disposal, the birds which have chosen Laysan for their breeding home would not be able to find satisfactory places if they all arrived at the same time. They are, therefore, obliged to take turns, so that some species of sea birds leave the place as soon as their young are strong enough to fly, and while the former occupant is leaving, the new-comers already begin to arrive. Thus there is a constant coming and going, and it follows that breeding species are found at almost every season of the year—a fact which is remarkable even in the tropics, where the breeding season is generally less regular than in our latitudes. In this way a most definite succession, which probably dates back thousands of years, takes place year after year in the arrival and departure of certain species.

A commercial company makes a good profit out of the phosphate deposits on the island. At one time it also made money out of the albatross eggs (see picture, page 495), but this wanton practice has since been stopped.

Sulphur Mine in Nevada.—The amount of sulphur produced in the United States is but a small percentage of the amount annually consumed. Three states, Louisiana, Nevada, and Utah, named in the order of their importance as producers of sulphur, contribute to the domestic output. Their united production for 1902 was 8,336 short tons, valued at $220,560. In addition to this, the country consumed 174,939 long tons of imported sulphur, principally from Sicily. But for the unfortunate fact that there is no duty on imported sulphur, the production from native deposits might be expected to increase in proportion to the demand. Mr George I. Adams has written for a recent bulletin (No. 225) of the U. S. Geological Survey, entitled "Contributions to Economic Geology, 1903," a capital description of the Rabbit Hole sulphur mines of Nevada. It is thought that the sulphur at these mines was derived from a great depth and deposited as a result of solfataric action.

The sulphur is obtained from open pits, tunnels, and underground chambers. In its more beautiful form it occurs as masses of crystals depending from the walls of irregular cavities and incrusting free surfaces. It has the beautiful yellow color of crystallized sulphur, with here and there a reddish tinge due to the presence of a small amount of cinnabar. The most important mass of sulphur is, however, of a different type, and has the appearance of having originated in a flow of molten sulphur which welled up and filled open channels in the rocks. It contains occasional fragments of rocks, but is remarkably pure. Its color is a dark resinous yellow.

GEOGRAPHIC NOTES

A FOSSIL EGG

IN the *American Journal of Science* for November there is an article upon one of the most interesting events in the world—the discovery of a fossil egg with its contents practically intact but converted into bitumen—a veritable romance of reality, which even the technical language of the scientific expert can not rob of interest. Oh for the pen of a ready writer! What a fascinating story, yet absolutely true, could be hatched out of that egg!

A prospector, examining the stones in the Gila River in Arizona, came upon a water-worn pebble 4 or 5 inches in diameter. He cracked off a fragment with his pick and discovered a fossil egg inside. The specimen fell into the hands of a gentleman in California who has now brought it to the attention of scientific experts. He has loaned it for examination to the California University, and the November number of the *American Journal of Science* contains photographs of it and a technical account of the result of the examination. The chief point of interest from a scientific point of view is the fact that the contents of the egg have been converted into a bituminous substance resembling asphalt, thus supporting the hypothesis that bitumen is derived from animal remains.

The egg is quite large—as large as that of a duck or goose—and resembles most closely the egg of a cormorant. It is so perfectly preserved as to show that it must have been completely imbedded very shortly after it was laid in the substance that afterwards consolidated into limestone. Thus we have a snapshot photograph of an event that happened hundreds of thousands of years ago. A bird of the size of a cormorant or goose laid this precious egg, which by some mischance tumbled into the water, or at all events into the soft ooze of which limestone is formed, with sufficient force to become completely imbedded in the ooze and thus protected. For countless years this ooze continued to be formed on top, and at last the whole became consolidated into limestone. Then the limestone was lifted from its watery bed by volcanic or other action and became a portion of a mountain range. Then erosion began. Through the agencies of frost and rain, sunshine and cold, fragments of limestone were broken off, until at last the egg was reached, and the fragment containing it fell into one of the gullies that feed the Gila River. There, in flood time, it was rolled over and over, amid a multitude of other stones, small and large, until all its angles were rubbed off and it became a water-worn pebble in a mountain stream, moving ever downward when the floods came in sufficient volume to stir it from its resting place, and then a prospector, searching for gold or other mineral, found it and cracked it with his geologic pick, exposing one end of the egg. What a wonderful history! But still more wonderful is the thought of the thousands and thousands of years that must have elapsed between the day when the egg fell into the water and became imbedded and the day when it next met the light, as a fossil, in the hands of a man.

WEALTH OF ALASKA

THE resources of Alaska are continually surprising the world as the exploration of the territory proceeds. A geologist of the U. S. Geological Survey, Mr A. J. Collier, who spent the past summer examining the coal deposits of the Arctic coast of Alaska, near Cape Lisburne, reports that they are much thicker, more numerous and extensive than has been generally supposed. Of the two coal-bearing formations the Mesozoic, which has been

known for the last three-quarters of a century, commences at a point 25 miles east of Cape Lisburne, and is continuously exposed along the coast to Cape Beaufort, a distance of 40 miles. It contains the well-known Corwin and Thetis mines, the location of which has been shown on many recent maps of Alaska.

Geologic study shows that the Coal Measures of these fields have a total thickness of at least 15,000 feet and contain not less than 40 beds of coal, each over a foot thick. The aggregate thickness of all the beds seen by Mr Collier is over 150 feet. Eleven of them are more than 4 feet thick and contain coal of good quality. Analysis of samples from some of the beds shows the product to be low-grade bituminous coal. A limited amount of coal has been mined here since 1879 for whalers and revenue cutters. Several cargoes were mined in 1901 and sold at Nome markets for $18 and $20 a ton, in competition with Comax and Washington coal at $25 a ton.

None of the coal beds have been permanently developed. The coal produced was mined from the croppings along the sea cliff and boated off to the ships through the surf. There is no harbor for vessels nor protection from any but south winds. In 1903 a small amount of coal, probably not exceeding 20 or 30 tons, was produced at the Corwin mine. In 1904 about 20 tons were taken by the steamship *Corwin*, and about 10 more tons were mined for consumption at the Point Hope whaling station.

The second coal-bearing formation, the Paleozoic, is also quite extensive and is south of Cape Lisburne. Beds over 4 feet in thickness occur. No analysis of this coal has yet been made. They are bituminous and of considerably better grade than the Mesozoic coals of the region. They are totally undeveloped.

NOTICE

MEMBERS of the National Geographic Society who possess copies of the NATIONAL GEOGRAPHIC MAGAZINE for January, March, April, and October of this year (1904) and are willing to dispose of them will confer a favor by sending the copies to the offices of the Society, Hubbard Memorial Hall. Twenty cents will be paid for each copy returned in good condition.

Chart of the World.—The NATIONAL GEOGRAPHIC MAGAZINE in the January number, which begins a new volume, will publish a chart of the world showing all submarine cable systems and connections and also the steamship routes of the world. The chart is in four colors and is 25 by 45 inches. It was prepared by the Naval Hydrographic Office and will be republished by the NATIONAL GEOGRAPHIC MAGAZINE through the courtesy of that office.

John B. Hatcher, of the Carnegie Museum, Pittsburg, and the organizer and leader of several expeditions to Patagonia, died in July, 1904. Mr Hatcher was only 42, which makes his death all the more deplorable. He was a member of the National Geographic Society and author of several papers on his work in Patagonia, published in the NATIONAL GEOGRAPHIC MAGAZINE and in *The American Journal of Science*.

A review of the laws forbidding the pollution of inland waters in the United States, which may be of great practical benefit to the public, has been prepared by Mr Edwin B. Goodell for the U. S. Geological Survey. It is published as No. 103 of the series of Water-Supply and Irrigation papers, and may be obtained by application to the Survey.

The article on "China," by Hon. John W. Foster, published in this number, is the first of a series of papers to appear in the NATIONAL GEOGRAPHIC MAGAZINE on the subject of the Far East.

DECISIONS OF U. S. BOARD ON GEOGRAPHIC NAMES.

Approved October 5, 1904.

American; stream, tributary to Bumping River, Yakima County, Washington (not American River, Miners Creek, Miner, nor Miners).

Beer; kill, town of Wawarsing, Ulster County, New York (not Good Beer nor Beer Kill).

Carmans; river and creek in the town of Brookhaven, Suffolk County, New York (not Connecticut, Carman's, nor Connectiquot River).

Coecles; arm of Gardiners Bay, Shelter Island, Suffolk County, New York (not Coecle Harbor Inlet, Coecle's Harbor Inlet, Coeclis Inlet, nor Cockles Harbor).

Gabilan; mountain range and peak between Monterey and San Benito counties and creek in Monterey County, California (not Gavilan nor Fremont).

Heady; creek forming boundary between Southampton village and the Shinnecock Indian Reservation, Suffolk County, New York (not Header).

Jennings; the northwest point of Shelter Island, Suffolk County, New York (not Rocky nor Stearns).

Ketch; brook tributary to Scantic River, Hartford and Tolland Counties, Connecticut (not Catch).

Leelanau; county in Michigan (not Leelanaw).

Northwest; harbor, town of Easthampton, Suffolk County, New York (not West, Northwest Harbor, nor Northwest Bend).

Peekamoose; mountain in the town of Denning, Ulster County, New York (not Peak o' Moose, Peakamoose, nor Peek O'Moose).

Picacho; peak, San Diego County, California (not Chimney).

Robins; island in Suffolk County, New York (not Robin's nor Robbins).

Sebonac; neck in town of Southampton, Suffolk County, New York (not Sebonack nor Seponack).

November 2, 1904.

Anthony; ponds (chain of three) tributary to Long Lake near foot, Hamilton County, New York (not S. Anthony nor St. Anthony).

Bernard; township in Somerset County, New Jersey (not Bernards).

Big Bay de Noc; bay, Delta County, Michigan (not Bay d' Enoc, Bay de Noq, Bay de Noque, Bay des Noquet, Bay des Noquets, Bay de Nocquet, Bay de Noquette, nor Bay d' Enoquet).

Casadepaga; river on Seward Peninsula, Alaska (not Koksuktapaga nor Casa-de-paga).

Corner; pond between Long Lake and Catlin Lake, Long Lake township, Hamilton County, New York (not Belden).

Dearing; post-office and railroad station, Montgomery County, Kansas (not Deering).

Dille; bottom and railroad station, Belmont County, Ohio (opposite Moundsville, West Virginia) (not Dillies, Dilly's, nor Dillon's).

Dilles Bottom; post-office, Belmont County, Ohio (not Dille, Dille's, nor Dilly's).

Dix; river, Kentucky (Rockcastle, Lincoln, Garrard, Boyle, and Mercer Counties) (not Dick, Dyck's, Dicks, nor Dick's).

Forge; river in the town of Brookhaven, Suffolk County, Long Island, New York (not Mastic).

Harpursville; village, post-office, and railroad station in Coleville, Broome County, New York (not Harpurville nor Harpersville).

Jenkins; pond or lake, Altamont town, Franklin County, New York (not Lake Madeleine).

Junction; post-office and railroad station, Boyle County, Kentucky (not Junction City).

Laferty; post-office and railroad station, Belmont County, Ohio (not Lafferty.)

Little Bay de Noc; bay, Delta County, Michigan (not Bay d'Enoc, Bay de Noq, Bay de Noque, Bay des Noquet, Bay des Noquets, Bay de Nocquet, Bay de Noquette, nor Bay d'Enoquet)

Little Simon; pond or lake, town of Altamont, Franklin County, New York (not Lake Willbert nor Little Simons).

Long; pond, tributary to Jenkins Pond, town of Altamont, Franklin County, New York (not Heaven nor Heavens).

McMahon; creek, Belmont County, Ohio, tributary from the west to the Ohio at Bellaire (not McMahans, McMahan's, McMahon's, nor M'Mahon's).

Mashomack; southeast point of Shelter Island, Suffolk County, New York (not Mashomuck, Meshomac, nor Meshomuck).

Mattituck; pond in Southold, Suffolk County, Long Island, New York (not Maratooker, Marratooka, nor Mameweta).

Mulhockaway; creek in Union township, Hunterdon County, New Jersey (not Mullackaway nor Big Brook).

Pickwacket; pond in Long Lake township, between Long Lake and Catlin Lake, Hamilton County, New York (not Pickwocket nor Pigwaket).

Port Murray; post-office and railroad station, Warren County, New Jersey (not Port Murry).

Shelby; post-office and railroad station, Boyle County, Kentucky (not Shelby City).

Sparta; mountains, Sparta and Byram townships, Sussex County, New Jersey (not Wallkill).

Steel; post-office, Steele District, Wood County, West Virginia (not Steele).

GEOGRAPHIC CONGRESS ABSTRACTS

THE TOWER OF PELÉE

BY PROF. ANGELO HEILPRIN

The speaker detailed the general features of this remarkable structure, supplementing his observations with photographic views taken by him on June 13, 1903, from the crater-rim. At that time the giant obelisk rose out from the new crateral summit (the "cone" or "dome") to a height of about 840 feet. The speaker dissented from the generally accepted view that this Tower represented a rapidly cooling lava, whose solidification was effected at the time of extrusion, and expressed his belief that in all probability it was an ancient volcanic core, which had been dislodged and lifted out as the result of Pelée's forceful activity. Many facts connected with the structure of the Tower, as well as its general cork-like aspect, supported this conclusion.

THE SCULPTURE OF MASSIVE ROCKS

BY G. K. GILBERT

The general principle that rock partings facilitate erosion is sufficiently familiar, but the correlative principle that massive rocks are peculiarly resistant has received less attention. The granite districts of the Sierra Nevada afford exceptional opportunities for the study of the control of sculpture by phenomena of continuity and discontinuity, because rock of uniform composition and texture is in some places massive and elsewhere jointed. In the massive condition it is comparatively resistant to all forms of atmosphere, aqueous and glacial attack, except abrasion.

GORGES AND WATERFALLS OF CENTRAL NEW YORK

BY PROPESSOR R. S. TARR, CORNELL UNIVERSITY, NEW YORK

Near head of Cayuga and Seneca lakes, two of the Finger lakes of central New York, there are numerous gorges and waterfalls, of which Watkins Glen is the most widely known. The paper describe some of these gorges and falls, showing that their abundance depends upon the presence of a series of hanging valleys, tributary to the main valleys, which are occupied by Lakes Cayuga and Seneca. In descending from these hanging valleys the streams have cut gorges in the Devonian shales, in which are numerous falls, especially where the water passes from stronger to weaker layers. The influence of joint planes and of a series of older drift-filled gorges upon the outline of the gorge walls and the waterfalls was described.

MOTHER MAPS OF THE UNITED STATES

BY HENRY GANNETT

This is a revision of an article published by me under the same title in the NATIONAL GEOGRAPHIC MAGAZINE in March, 1892, bringing the subject up to the present date. It is a summary of the sources of geographic information concerning the main body of the United States; characterizing the work of the U. S. Geological Survey, Coast and Geodetic Survey, Land Office, and other geographic organizations; showing the extent and relative value of their contributions, and rating them in accordance with the scale for which they are fitted.

SCHOOL GEOGRAPHY IN THE UNITED STATES

BY MARTHA KRUG GENTHE

School geography at present represents the larger part of the geographic work done in the United States. This is partly so because at the elementary school the choice of studies does not depend upon the student, as in the higher institutions, partly because under the name of geography a great many kindred subjects are taught, especially in the lower classes. A more definite separation between these subjects and geography proper seems desirable.

The progress of teaching in the last years has brought about a more and more pronounced tendency to replace mere text-book information by oral instruction, and this requires a higher standard of preparation of the teacher.

A most important aid to develop the power of reasoning and of observation in the child are the practical exercises indoors and outdoors, representing the application beyond the kindergarten stage of the principles of Fröbel and his school. The numerous illustrations in the text-books serve the same purpose. Care must be taken, however, not to overdo in this line.

The multitude of geographical subjects is greatly simplified by reducing the instruction to a study of typical forms. The type idea must be presented to the child after, not before, the study of the individual objects.

Map-making, and consequently map study, are the lines along which much improvement is still desirable. In view of the facilities

offered by the government, better results than those hitherto produced should be expected.

THE RELATIONS OF COMMERCE TO GEOGRAPHY

BY O. P. AUSTIN

The relations of commerce and geography have always been close and important. The earliest knowledge of geography was the result of explorations made in the interest of commerce, and this continued the case for many centuries. The commercial enterprises of the Phœnicians gave the earliest recorded geographical knowledge regarding the countries fronting upon the Mediterranean, and commercial explorations along the west of Europe and Africa contributed further geographical information. This was also true of the commercial explorations of the Greeks., while the contributions to geographical information by the Romans were divided between their military and commercial conquests. Commerce was also the moving cause in the work of the Venetians, who thus contributed much information regarding the geography of the then known world It was commercial enterprise, the search for a route to India, which led to the discovery of America and the route to the Orient and Southern Africa. Later the great commercial companies which developed trade with America, India, and the Orient in turn gave to the world much definite and valuable geographical information. While in later years geographic research has been largely made in the interests of geography as a science, it has always been accompanied by an expansion of commerce. Thus commerce and geographical knowledge have always been coöperative, and to a great degree interdependent, and this must be the relation of commerce and geography during the twentieth century. The section of the world in which they will be specifically called upon to operate and coöperate is that which is generally known as "the tropics." The area lying between the thirtieth parallels of north and south latitudes contains one-half of the land area of the world and half its population; yet it now contributes but one-sixth of that which enters into international commerce. The great commercial and geographical work of the twentieth century should and will be to make this great area contribute its proper share to the requirements of man—a task especially important in view of the rapidly increasing population of the world. Recent developments of science enable man to now overcome those natural obstacles which formerly prevented his subjugation of the tropics, and this naturally most productive section of the earth, the tropics, must now be peopled, developed, and required to supply its proper share of the requirements of the world's rapidly increasing population. Already the temperate zone has come to rely upon the tropics for many of its requirements for food and manufacture, and this reliance is rapidly increasing. The temperate-zone nations have within recent years assumed control of most of the tropical sections of the world, and will now apply their energy and scientific knowledge to the development of that part of the world. In this work geography and commerce must coöperate. The geographical information already in hand regarding the tropics will be required by commerce, and commerce in turn will supply to geographic science much information which it still lacks regarding this most important of the yet undeveloped sections of the world.

THE SUBMARINE GREAT CANYON OF THE HUDSON RIVER

BY J. W. SPENCER

In the channel of the Hudson River, seen on the continental shelf, Prof. J. D. Dana first recognized the evidence of a late continental elevation to 720 feet. In 1885 Prof. A. Lindenkohl discovered that the channel at about 100 miles from New York was transformed into a canyon reaching a depth of 2,844 feet beneath sea-level, with an apparent barrier across it. In 1897 I pointed out that, although the evidence was scanty, the valley was traceable to 12,000 feet. I have now found the proof that at the apparent barrier is a narrow canyon, and 4 miles beyond and 31 from head of the gorge it reaches a depth of 4,800 feet, where the continental slope is submerged only 1,000 feet, making a narrow gorge with precipitous walls, having a depth of 3,800 feet At 48 miles from its head the valley is more than 2,000 feet deep, but at about 42 miles I place the location where the canyon form begins to pass into the valley stage, with a depth of between 6,000 and 7,000 feet below sea-level. The valley is further traceable to a depth of about 9,000 feet at 71 miles from the head of the canyon. In its gradient there are two known great steps, and, further, the slope is supposed in part to be by steps. The deep channel, at about 6,000 feet, of the Connecticut River is also discovered. In its upper part the Hudsonian canyon makes two right-angled turns in the floor of the continental shelf. The conclusions are that the region stood 9,000 feet higher in the earlier Pleistocene than now, followed by a subsidence below the present, then reëlevation to 250 feet, with subsequent minor changes. This canyon becomes proof of the evidences of great changes of level found in the Antillean region.

GEOGRAPHIC LITERATURE

Manchuria. Its People, Resources, and Recent History. By Alexander Hosie. Illustrated. Pp. 293. 6 by 9 inches. New York: Charles Scribner's Sons. 1904.

The present volume was published in England several years ago and now in revised form appears in America for the first time. It is the standard work on Manchuria, the author having been the British consul at Niuchwang from 1894 to 1897, and again in 1899 and 1900. Mr Hosie gives an excellent description of the country and especially of its agricultural wealth and possibilities.

The standard of education in Manchuria, from a Chinese point of view, is not of a very high order, and comparatively few literary honors have fallen to its inhabitants; this is largely due to the fact that the population in the country districts is sparsely scattered over a very large area, so that educational facilities are not yet so well organized as in China proper. The Manchus form only 10 per cent of the population. Intellectually the Manchu is no match for the Chinese, as he lacks the intelligence and capacity which are characteristic of the latter.

The domestic commerce of Manchuria is enormous. On the road from Mukden and Tie-ling to the north the author met thousands and thousands of carts loaded with merchandise.

"I have traveled in different parts of China, I have seen the great salt and piece-goods traffic between Ssu-ch'uan, Kwei-Chow, and Yunnan, but I never saw a sight which from its magnitude impressed me so much with the vast trade of China as the carrying trade from north to south in Manchuria. Until late in the afternoon, when, owing to a snowstorm, we had to abandon the possibility of making the city of K'ai-yuan Hsien that night, we met at least a thousand carts heavily laden with the produce of the interior, including beans, tobacco, abutilon hemp, dressed pigs, skins, and large droves of black pigs, all bound south. If we take the average team to have numbered five animals, we met some five thousand animals in one day. At one place, where a difficult gully had to be crossed, there was at least one mile of carts, three deep, waiting their turn to pass it. Numbers of men and boys were to be seen on the roads vying with each other in collecting the droppings of animals, which they scooped into wicker baskets. Much valuable manure is thus collected and utilized in the adjoining fields."

Probably not more than one-fifth of the whole arable land of Manchuria is at present under cultivation.

The present colonists are of themselves unable to cope with the land they have taken up, and labor is yearly imported from the northern provinces of China, especially Shan-tung and Chihli, to till, sow, and reap. From Chefoo alone more than twenty thousand Chinese laborers come to Niuchwang every spring by steamer and distribute themselves all over Manchuria and eastern Mongolia.

The most important cereal grown in Manchuria is the tall millet (Kao-liang), or *Holcus sorghum L.* It is the staple food of the population and the principal grain feed of the numerous animals engaged in the farmwork and in the immense carrying trade of the three provinces. The natives boil the millet for an hour into a soft, pulpy mass. "It is then scooped into bowls and eaten with boiled, fresh, or pickled vegetables, with the aid of chopsticks, just like rice. No salt or other seasoning is added to the millet while being boiled, and the taste is very insipid. An ordinary servant consumes two pounds of millet per day, while a hard-working man will, it is alleged, consume double that quantity.

It is found that a change of diet is occasionally required, and native flour, which is coarser and goes a much longer way than foreign flour, is from time to time taken as a substitute for millet. A Chinese friend of mine has five servants, and he supplies them monthly with 240 pounds of millet, 16 pounds of native flour—sufficient for two days—and on two days of the month with meat. The dates on which flour and meat are given are fixed, and the intervals between them are, as near as possible, equal. But the grains are not the only useful part of the tall millet; the stalks play a very important rôle in Manchuria. The outer leaf layers are woven into mats, which are so much required in the trade of the country for inclosing ricks and packing loads of grain and beans, and for fencing, bridging, and house-building, and where wood and coal are unobtainable or dear they are used for fuel. In spring, too, the roots are plowed up and collected for fuel. It is estimated that from 4,000 to 5,000 carts laden with bundles of millet stalks come into the port of Niuchwang every winter from a radius of 10 to 12 miles to supply a population of about 70,000."

Manchuria is an ideal wheat field, and both barley and wheat are grown in considerable quantities. They are sown in drills in March and harvested in June, wheat ripening ten days earlier than barley. Wheat especially is cultivated on both banks of the Sungari, within the Hei-lung-chaing and Kirin provinces, and is exported in junks to the Russian province of the Primorsk.

It is difficult to disassociate the cultivation of rice from a constant and abundant water supply, but in Manchuria rice is grown on dry land like other cereals, and, unlike them, the crop is not ruined by a superabundance of rain. As, however, it is twice the price of tall millet, the staple food of the people, it is not extensively grown. The cultivation of this dry-grown rice deserves the attention of countries like India, where a failure or deficiency of the rainfall means famine or dearth.

Mr Hosie devotes one chapter to an interesting account of the manufacture of bean-cake and bean oil and to the manufacture of salt from sea water.

By far the most important branch of the skin and fur trade of Manchuria consists of the skins of the domesticated animals—the dog and the goat. Many thousands of these skins are annually exported from Niuchwang and Tientsin, and ultimately find their way principally to the United States.

There are thousands of small dog and goat farms scattered over the northern districts of Manchuria and Mongolia, where from ten to hundreds of animals are reared yearly. When a girl is married she receives perhaps six dogs as her dowry, and it can easily be understood that this comparatively small beginning may be the foundation of a large fortune, seeing that the reproduction of ten per annum would in a few years give an enormous total. A dog matures in from six to eight months, and the fur is at its best during the winter; so that the animal must be destroyed before the thaw sets in. Nature has provided a magnificent protection to withstand the cold of these northern latitudes, where the thermometer (Fahrenheit) goes down to 25° below zero—*i. e.*, 57° of frost—and it is doubtful if the dog skins in any other part of the world are to be compared with those that come from Manchuria or Mongolia, either in size, length of hair, or quality. The question of food for so many animals naturally presents itself. If they had to be kept entirely by their masters, the industry could not be a paying one. The coarsest grain—millet that is not good enough for horses—mixed with the ordure and rubbish of the farm is always ready for them when by foraging outside they are unable to satisfy the pangs of hunger.

The minerals of Manchuria have not yet been scientifically explored, but gold, iron, coal, and soda are extensively worked, and silver, copper, and lead are known to exist. Gold is widely distributed throughout the three provinces of Manchuria, but the richest deposits are found in the far north, on the right bank of the Amur, the dividing line of Manchuria and Siberia.

BOOKS RECEIVED

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Western Uganda, Rev. A. B. Fisher. The Geographical Journal.

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On Mountains and Mankind, Douglas W. Freshfield. Popular Science Monthly.

Great Industries of the United States, Wm. R. Stewart. Cosmopolitan.

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Hanover, Hildesheim, Brunswick, Clara M. Stearns. Chautauquan.

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The Methods of the Earth Sciences, Prof. T. C. Chamberlin. Popular Science Monthly.

To the Sahara by Automobile, Verner Z. Reed. Cosmopolitan.

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Oaxaca's Mining Wealth, T. C. Graham. Modern Mexico.

Morocco, the Land of the Evening, Charles Wellington Furlong. Outlook.

A Buddhist Paradise in Korea, William Thorp. Independent.

The Actual Building of a Chinese Railway, Justin Burns. Engineering Magazine.

A Survey of the Mines and Mineral Industries of Italy, Enrico Bignami. Engineering Magazine.

Iowa's Campaign for Better Corn, Prof. P. G. Holden. Review of Reviews.

Western Canada in 1904, Agnes C. Laut. Do.

NATIONAL GEOGRAPHIC SOCIETY

THE POPULAR COURSE

THE addresses in this Course will be delivered in the National Rifles Armory, 920 G street, at 8 p. m. on Friday evenings. Mr Foster's address of November 25 is published in this number. Other addresses will appear in later numbers of the NATIONAL GEOGRAPHIC MAGAZINE.

December 9.—"Recent Observations on the Russo-Japanese War, in Japan and Manchuria." By Dr Louis Livingston Seaman. Illustrated.

January 6, 1905.—"Japan." By Baron Kentaro Kaneko, of the House of Peers of Japan, LL. D., Harvard, 1899.

January 20.—"Russia." By Hon. Charles Emory Smith, formerly Postmaster General and Minister to Russia.

February 3.—"The Philippines." The Secretary of War, Hon. Wm. H. Taft, formerly Civil Governor of the Philippine Islands, has accepted the invitation of the Society to deliver the address on this subject, provided that the demands of public service do not interfere.

February 17.—"Manchuria and Korea." By Mr Edwin V. Morgan, U. S. Consul to Dalny. Illustrated.

March 10.—"The Panama Canal." Rear Admiral C. M. Chester, U. S. N., Superintendent of the Naval Observatory. Illustrated.

March 24.—"The Commercial Prize of the Orient and its Relation to the Commerce of the United States." By Hon. O. P. Austin, Chief of the Bureau of Statistics. Illustrated.

March 31.—"From Lexington to Yorktown." By Mr W. W. Ellsworth, of the Century Company. Illustrated.

April 14.—"Fighting the Boll Weevil." By Dr L. O. Howard, Chief of the Bureau of Entomology. Illustrated.

April 21.—"Niagara Falls." By Dr G. K. Gilbert, Vice President National Geographic Society. Illustrated.

SCIENTIFIC MEETINGS

The meetings of this course will be held at the new home of the Society, Hubbard Memorial Hall, Sixteenth and M streets, on Friday evenings, of the following dates.

December 2.—1. Geography of Alaska. By Dr Alfred H. Brooks, of the U. S. Geological Survey.

2. The Alaskan Telegraph System. By General A. W. Greely, U. S. A., Chief Signal Officer.

3. The Salmon Fisheries of Alaska. By Dr Barton W. Evermann, of the Bureau of Fisheries.

4. Introducing Reindeer into Alaska from Siberia. By Dr William Hamilton, of the Bureau of Education.

December 16.—"A Geologist in China." By Mr Bailey Willis.

"A Naturalist in China." By Dr C. L. Marlatt.

"Some Remarks About Tibet and Chinese Turkestan." By Mr O. T. Crosby.

December 30.—General subject, "The Rocky Mountains." By Mr Robert H. Chapman, Mr W. H. Osgood, and Mr E. C. Barnard.

Thursday, January 12, 1905.—General subject, "The Reclamation Service." Mr F. H. Newell, Chief Engineer, and other engineers of the Reclamation Service, will describe the different irrigation works now being constructed.

January 13.—Annual meeting. Reports of officers and elections.

January 27.—General subject, "The American Deserts."

1. Vegetation. By Mr F. V. Coville, Botanist of the Department of Agriculture.

2. Physiography. By Dr G. K. Gilbert.

3. Introducing the Date Palm. By Mr W. T. Zwingle.

February 10.—General subject, "Progress in Animal Husbandry." There will be papers by Mr George M. Rommel, Mr G. Fayette Thompson, and others of the Department of Agriculture, on the work and plans of the Department for producing distinctive American breeds of Horses, on the Angora Goat, the Fat Tailed Sheep, the Barbadoes Woolless Sheep, on the introduction of the Bos indicus, etc.

February 24.—General subject, "The Botanical Investigations of the Department of Agriculture." By Mr F. V. Coville, Botanist, and members of his staff

March 3.—General subject, "Progress in Plant Physiology." Papers by Dr George T. Moore and others on "Inoculating the Ground," "Protecting Municipal Water Supply Systems," etc.

March 17.—General subject, "Japan."

The Geography of Japan. By Mr Eki Hioki, First Secretary of the Japanese Legation.

The Fisheries of Japan. By Dr Hugh M. Smith.

Agriculture in Japan. By Mr David G. Fairchild.

April 7.—General subject,

"Forestry."

Papers by Mr Gifford Pinchot, Mr Overton Price, and others, of the U. S. Bureau of Forestry, and a paper on Japanese Bamboos, by Mr David G. Fairchild.

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ISSUED AS A SUPPLEMENT TO THE NATIONAL GEOGRAPHIC MAGAZINE, MAY, 1904

Supplement to the National Geographic Magazine, March, 1904.

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MAP OF KOREA AND MANCHURIA

PREPARED BY THE

SECOND DIVISION, GENERAL STAFF

(MILITARY INFORMATION DIVISION)

WAR DEPARTMENT

WASHINGTON, U. S. A.

FEBRUARY, 1904.

SCALE OF MILES

AUTHORITIES

Map of the Far Eastern Spheres of Russian Influence, by the Amur Society of Japan.
Map of the Southern Boundary Region of Asiatic Russia, by the Russian General Staff.
British Admiralty and U.S. Hydrographic Charts.

Note: Korea generally mountainous. • Wells on caravan routes in desert of Gobi.

Longitude East from Greenwich

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